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Draft environmental impact statement ASARCO Rock Creek

# Draft Environmental Impact Statement
# ASARCO ROCK CREEK PROJECT

Prepared By:

Montana Department of Environmental Quality
and
U.S. Forest Service

July 1995

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# ASARCO, INCORPORATED'S ROCK CREEK PROJECT

July 1995

U. S. Forest Service
Kootenai National Forest

Rob L. Schrenk
Robert L. Schrenk, Forest Supervisor

Montana Department of
Environmental Quality

Mark Simonich
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## VOLUME 2

# CHAPTER 5

# CONSULTATION WITH OTHERS

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## CHAPTER 5: CONSULTATION WITH OTHERS

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ASARCO, Incorporated
Bonneville Power Administration
Cabinet Resource Group
Clark Fork - Lake Pend Oreille Coalition
Communities for a Great Northwest
Confederated Salish and Kootenai Tribes of the Flathead Nation
Flathead Electric Cooperative, Inc.
Great Bear Foundation
Idaho Division of Environmental Quality
Kootenai Culture Committee
Kootenai Flyfishers
Kootenai Wildlands Alliance
Libby Area Chamber of Commerce
Libby Placer Mining Company
Libby Tomorrow
Lincoln County Commissioners
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Montana Department of Fish, Wildlife and Parks
Montana Department of Health and Environmental Sciences
Montana Department of Natural Resources and Conservation
Montana Department of Revenue
Montana Department of Highways
Montana Mining Safety and Health Administration
Montana Outfitter and Guides Association
Montana Rail Link
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U.S. Borax & Chemical Company
U.S. Fish and Wildlife Service
Washington Water Power
Western Montana Building and Construction Trades Council

## COOPERATING AGENCIES

Idaho Department of the Environment
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U.S. Environmental Protection Agency

# CHAPTER 6

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# CHAPTER 6: PREPARERS AND CONTRIBUTORS

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# CHAPTER 7

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# CHAPTER 7: DISTRIBUTION AND REVIEW OF THE EIS

## DISTRIBUTION AND REVIEW OF THIS DRAFT EIS

Copies of this draft EIS are being provided to about 300 persons, groups, local governments, and agencies that have expressed an interest in the Rock Creek Project. The mailing list was compiled using the names and addresses of:

- parties who participated in public meetings or who submitted written comments;
- parties who have requested copies of the draft EIS;
- agencies, governments, tribes, and companies potentially affected by the proposed operation; and
- agencies and groups consulted during draft EIS preparation.

The following agencies, organizations, and individuals received a copy of the draft EIS or executive summary:

### Federal, State, and Local Agencies

Bonners County Planning Department
Bonneville Power Administration
Clark Fork Library
Confederated Salish, Kootenai Tribe
Eastern Bonner Public Library
Federal Energy Regulatory Commission
Federal Highway Administration
Federal Railroad Administration
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Idaho Department of Fish and Game
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Kootenai Tribal Council
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Montana Department of Health and Environmental Sciences

Montana Department of Natural Resource and Conservation
Montana Department of Revenue
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Montana Water Quality Board
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U.S. Army Corps of Engineers
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U.S. Bureau of Mines
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Montana Department of Environmental Quality, Helena, MT
Montana Department of Health and Environmental Sciences, Helena, MT
U.S. Corps of Engineers, Helena, MT
Mansfield Library, University of Montana, Missoula, MT
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Missoula City-County Library, Missoula, MT
East Bonner County Library, Sandpoint, ID
Thompson Falls Library, Thompson Falls, MT
Heron Library, Heron, MT

Copies of this document are also available on request from:

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Montana Department of Environmental Quality
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# CHAPTER 8

# GLOSSARY

## CHAPTER 8: GLOSSARY

**acid-base potential.** A laboratory method to determine the acid-generating potential of sulfur minerals.

**activated sludge.** Collection of microorganisms and organic material in an aeration basin with the intent of producing a solid that will settle.

**adit.** A nearly horizontal passage, driven from the surface, by which a mine may be entered, ventilated, and unwatered.

**aerie.** A bird nest on a cliff or mountainside.

**air stripping.** A mass of transfer process in which ammonia is removed from water by bringing the water in contact with ammonia-free air. This process reduces the partial pressure of ammonia which causes the ammonia to leave the water phase and enter the gas phase.

**alluvium.** Soil and rock that is deposited by flowing water.

**ambient.** Surrounding, existing.

**analyte.** A chemical to be analyzed in a water quality lab.

**appropriators.** Persons or corporations that have a legal right to take and use surface or ground water resources.

**aquifer.** Rock or sediment which is saturated with water and sufficiently permeable to transmit economic quantities of water to wells.

**arete.** A glacial feature caused by glacial erosion of both sides of a ridgeline.

**argillite.** A rock that has formed as a result of the hardening of sediments by pressure and heat. Argillite is harder than mudstone and not as hard as shale.

**background.** (air quality) Ambient. (scenic) The viewed landscape from 4.8 km (3 mi.) to infinity from an observer.

**bear analysis area (BAA).** A sub-unit of a BMU used to analyze open road densities. Also used to determine the adequate amount of replacement habitat.

**bear management unit (BMU).** Land area containing sufficient quantity and quality of all seasonal habitat components to support a female grizzly. Used to analyze percent habitat effectiveness (HE).

**biodiversity.** A term that describes the variety of lifeforms, the ecological role they perform, and the genetic diversity they contain.

**borrow materials.** Soil or rock dug from one location to provide fill at another location.

**breakpoint chlorination.** Also known as superchlorination, is accomplished by the addition of chlorine in an amount which will oxidize ammonia-nitrogen to nitrogen gas.

**candidate.** Those species under consideration for possible listing as "endangered", or "threatened", in accordance with the 1973 Endangered Species Act.

**catchment.** A geographic area that collects rain or snowfall.

**character type.** Pertains to a large physiographic area of land, such as the Columbia Rockies, which has common visual characteristics of landforms, rock formations, water features, and vegetative patterns.

**chlorine contact chamber.** A basin designed to allow chlorine and bacteria to come in contact, with the intent of killing or reducing the viability of the bacteria.

**coarse fragment.** Rock that is larger than 2 millimeters (about 1/16 inch) in diameter.

**colluvium.** Fragments of rock carried and deposited by gravity.

**confluence.** The point where two streams meet.

**conservation assessment and strategy.** A biological analysis of species viability and a plan for managing a species that will allow it to survive over time. Includes biological information, current status, and management and monitoring strategies needed to conserve the species.

**contrast.** The juxtaposition of dissimilar elements (as form, line, color and texture) in the landscape. The closer the juxtaposition of dissimilar elements and the stronger their differences, the more noticeable they become.

**construction zone.** The area that includes the physical workings of a mine such as adits, roads, mills, tailings ponds, pipelines, and slurry lines.

**containerized seedling.** A small, young tree held within a container.

**cutoff.** A clay-filled trench beneath a dam to "cut off" water seeping beneath the dam.

**cyclone.** Centrifugal classifying device.

**dBA or decibels A scale.** A logarithmic unit for measuring sound intensity, using the decibel A weighted scale, which approximates the sound levels heard by the human ear at moderate sound levels, with a 10 decibel increase being a doubling in sound loudness.

**decant water.** Water recycled from the tailings pond to the mill for reuse.

**deep rip.** Breaking up compacted soil, or overburden, to a depth below normal tillage.

**degradation.** A process by which the quality of water in the natural environment is lowered.

**dilution.** A process in which the chemical concentration of constituents in a stream decreases as a result of mixing with cleaner water.

**dispersed recreation.** Recreation that occurs outside of developed sites in the unroaded and roaded environment (e.g., hunting, backpacking, and berry picking).

**discontinuity.** Any fracture in bedrock, such as faults and bedding fractures; a boundary between seismic layers of the earth.

**distance zones.** Portions of the viewed landscape that are designated distances from the observer; see foreground, middleground, and background.

**downgradient.** A direction characterized by lower fluid potential or hydraulic head.

**drainage sump.** A hole or pit that collects mine waters.

**drill seeding.** A mechanical method for planting seed in soil.

**dynamic flow failure.** Landslide movement characterized by fluid-like flow of the landslide material.

**earthquake loading.** The application of earthquake forces to a structure.

**effluent.** Waste water discharge.

**endangered.** Any species, plant or animal, that is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

**Endangered Species Act.** An act of Congress, enacted in 1973, to protect and recover threatened or endangered plant or animal species and their habitats. The Secretary of Interior, in accordance with the Act, identifies or lists the species as "threatened" or "endangered".

**ephemeral stream.** A stream that flows only as a direct response to rainfall or snowmelt events; having no baseflow.

**evaporation.** The physical separation of a liquid from a dissolved or suspended solid. Energy is applied to the system to volatize the liquid leaving the solids behind.

**face.** The part of an adit or mine that is actively being excavated; the end of the adit being excavated.

**factor-of-safety.** Forces causing sliding divided by forces resisting sliding; for example, at a factor-of-safety of 1.0, the forces causing sliding are the same as those resisting sliding.

**fault.** A fracture or fracture zone where there has been displacement of the sides relative to one another.

**fault gouge zone.** A soft clayey or clay-like material filling or partly filling a fault zone.

**flotation.** A mineral recovery process where individual mineral grains are selectively "floated" and skimmed off the top of an agitated water/chemical bath.

**forb.** Any herbaceous plant, usually broadleaved, that is not a grass or grass-like plant.

**foreground.** The viewed landscape from 0 to 0.8 km (0 to 0.5 mi.) from an observer.

**genus.** A group of related species used in the classification of organisms (plural = genera).

**glacial moraine.** Mounds and ridges of broken rock deposited by glacial action.

**ground water extraction system.** The configuration of wells and associated pumping rates required to contain or remediate ground water contamination.

**habituate.** Become accustomed to.

**hardness.** A measure of the amount of calcium, magnesium, and iron dissolved in the water.

**heavy metals.** Metallic elements with high molecular weights, generally toxic in low concentrations to plants and animals.

**homerange.** An area in which an individual animal spends most of its time doing normal activities.

**hydraulic conductivity.** A measure of the ease with which water moves through soil or rock; permeability.

**hydric soil.** A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic (water-loving) vegetation. Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

**hydrophytic vegetation.** The sum total of plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation.

**hydroseeding.** Distributing seed in a spray of water. Mulch and fertilizer may be added to the spray.

**impoundment dike.** An earthen dam or tailings dam.

**indicator species.** Species of fish, wildlife, or plants which reflect ecological changes. Forest Service has identified animal species that are used to monitor the effects of planned management activities on viable populations of wildlife and fish. The indicator species for the Kootenai National Forest are: grizzly bear, grey wolf, bald eagle, peregrine falcon, elk, white-tailed deer, mountain goat, and pileated woodpecker.

**intermittent stream.** A stream that does not flow continuously from its source to the mouth, at least for a portion of the year.

**introgress.** The mixing of genes from two closely related species (hybridization).

**ion exchange.** A process based on the use of specifically formulated resins. Selective ion exchange for the removal of ammonium is accomplished by passing liquid through a column of zeolite which has a high selectivity for the ammonium ion. After a critical relative concentration of recoverable ion to exchanged ion in the solution is exceeded, the exchange resin, zeolite, is said to be spent. Spent resin is usually recharged by exposing it to a very concentrated solution of the original exchange ion so that a reverse exchange takes place. This results in a regenerated resin and the removal of a concentrated solution of the ammonium ion.

**joint.** Fracture in rock, generally more or less vertical or transverse.

**lacustrine.** Pertaining to, produced by, or formed in a lake.

**land application disposal.** A method of disposing waste water that relies on sprinkler application over a large area and/or percolation ponds. Disposed water may evaporate, be used by vegetation, or infiltrate to the ground water system.

**leachate.** A solution obtained by leaching, as in the downward percolation of water through tailings materials, and containing soluble substances.

**limit equilibrium analysis.** A standard stability analysis.

**liquefaction.** When an earthquake occurs, energy released by rupturing in the earth's crust causes cyclic waves to travel through the rock and soil mass. Saturated soils can then experience enough pressure between the individual grains that the soil loses its cohesion (shear strength) and behaves as a liquid.

**loading.** Pertaining to the contribution of material or chemicals to a receiving stream.

**loess.** Wind blown soil deposits.

**long term.** A period greater than 35 years (i.e., postoperational).

**macroinvertebrate.** Small animals without backbones that are visible without a microscope, for example, insects, small crustaceans, and worms.

**macronutrient.** Elements necessary in large amounts for plant growth.

**mainstem.** The primary channel in a stream or river.

**makeup water.** Additional water required to supplement water lost during the milling process.

**management area.** Geographic areas, not necessarily contiguous, which have a common set of management requirements set by the KNF Forest Plan requirements and land allocations.

**management situations.** Areas of grizzly bear or mountain goat habitat, that due to their characteristics, have specific Forest Service management goals and directions.

**mesic.** Intermediate or moderate moisture or temperature; or reference to organisms adapted to moderate climates.

**microclimate.** A small area influenced by its own weather patterns.

**middleground.** The viewed landscape from 0.8 to 4.8 km (0.5 to 3 mi.) from an observer.

**mine dry.** Changing room for employees.

**mitigation.** An action to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

**moraine.** A landform resulting from glacial deposition of material such as boulders, till, gravel, sand, and clay.

**mycorrhizae.** An association that develops when certain fungi and plant roots form a mutually beneficial relationship. One of the beneficial results is that mycorrhizae help plants absorb nutrients for soils.

**neotropical migrant birds.** Bird species that migrate to tropical areas such as Central or South America for the wintering months. Includes most of Montana's song birds.

**nitrification/denitrification.** A biological process for the conversion of ammonia compounds to nitrogen gas. The process is carried out in two steps. In the first step, nitrification, the ammonia compound is aerobically converted to nitrate by bacteria. In the second step, denitrification, nitrate is aerobically converted to nitrogen gas.

**non-specular.** Conductor treated in the factory to remove the sheen normally present on new conductors.

**old growth areas managed by the KNF Plan.** These areas are managed as management areas (MA-13). The goal of MA 13 is to maintain 10 percent on KNF lands below 5,500 feet within a major drainage in old growth condition (as described below under old growth ecosystems). The Forest Plan direction is to provide a diversity of types of old growth units located throughout a drainage, ranging in size from 100 to 1,200 acres, with occasional units as small as 50 acres.

**old growth ecosystems.** Old growth ecosystems are distinctive forest stand mosaics functioning to provide sustained forest canopies, crucial diverse wildlife habitats, complete nutrient cycling, and valued aesthetic experiences over long periods of time. These stands are generally characterized by: 1) large diameter overstory trees (generally over 20 inches in diameter and 100 feet tall), 2) large standing snags and broken top trees, 3) abundant down woody material that holds moisture and helps nutrient cycling, 4) woody microsites with dead tops, saprophytic plants and extensive decay, 5) average tree ages in excess of 200 years, and 6) relatively closed multilayer forest canopies which modify local microclimates by providing shade, capturing moisture, and by moderating air movement and temperature.

**overburden.** Geologic material of any nature that overlies a deposit of ore or coal.

**palliative.** A substance that relieves the effects of a problem.

**palustrine system wetland.** Palustrine system wetlands are traditionally called marshes, swamps, bogs, or fens. They include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below O.5 percent.

**patio.** The level area immediately outside the adit portal, built of fill to provide a work area, and access to the mine area.

**peak flow.** The greatest attained water flow in a specified period of time.

**perched water table.** An isolated saturated zone above an impermeable layer in an otherwise unsaturated soil or rock.

**perennial stream.** A stream that flows throughout the year, and from source to mouth.

**period of record.** The period of time over which data have been collected.

**permeable.** Allowing the passage of fluids.

**phreatic surface.** The boundary between saturated and unsaturated soil zone in an aquifer.

**pillar.** A column of rock retained for structural support in a mine.

**piping.** Creation of tunnels or cavities from the movement of water in soil.

**plankton (ic).** Aquatic animal and plant organisms that drift or float, unable to influence their own course, and ranging in size from microorganisms to jellyfish.

**plasticity.** A soil property indicating the degree to which a soil can be molded before breaking.

**poaching.** Illegal hunting, including hunting without a license or proper permit or hunting out of season.

**portal.** Surface entrance to a mine, particularly to a tunnel or adit.

**pressure filtration.** A water treatment system that uses a filter in conjunction with a pump.

**probable maximum flood.** The flood resulting from Probable Maximum Precipitation; the largest flood event theoretically possible.

**quartzite.** A metamorphic rock consisting essentially of quartz.

**rain-on-snow event.** A meteorological occurrence during which the heat contained in rainfall melts the existing snow cover producing large amounts of runoff and high stream flows.

**raise.** Incremental increases in the height of a dam.

**raptors.** Birds of prey.

**reach.** An extended portion of river with uniform characteristics.

**redd.** A fish spawning nest.

**regeneration.** Regrowth of a tree crop, or other vegetation, whether by natural or artificial means.

**return ponds.** Storage ponds for water to be recycled to the tailings pond.

**reverse osmosis.** The normal osmosis process involves the flow of liquid across a semi-permeable membrane from a dilute concentration to a more concentrated solution until equilibrium is reached. Reverse osmosis is accomplished by application high pressure to the concentrated side causing the process to reverse. This results in an even higher concentration of solute. The nitrogen compounds involved in the reverse osmosis process are mainly in the ammonium or nitrate form.

**rhyzome.** A vegetative species that spreads by shooting out underground stems. (Rhyzomatous.)

**riparian.** Areas with distinct resource values and characteristics that are comprised of an aquatic ecosystem, and adjacent upland areas that have direct relationships with the aquatic system. This includes floodplains, wetlands, and lake shores.

**run-of-mill.** Total material passing through a mill.

**salmonid.** Member of the fish family Salmonidae; includes salmon and trout.

**scarify.** To roughen the upper 1 to 2 inches of soil in preparation for seeding.

**sedge.** A grass-like plant, often associated with moist or wet environments.

**sediment yield.** The quantity of sediment delivered to a stream.

**seepage collection system.** The system of drains, ponds, and pumps to collect and return tailings dam embankment seepage.

**segregation.** The separation of water from sources of contamination in a mine.

**seismic.** Of, or produced by, earthquakes.

**sensitive species.** Those species, plant and animal identified by the Regional Forester for which population viability is a concern, as evidenced by: 1) significant current or predicted downwards trend in population numbers or density or 2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

**seral stage.** A developmental stage in the succession of plant communities. A seral community (or species) is replaced by another community (or species) as succession progresses.

**short term.** A period of time less than 35 years (i.e., operational period).

**side slope.** The slope of an embankment or waste dump.

**significant.** See **Appendix A.**

**slurry.** A mixture of fine-grained solid material and water used to allow pumping as a way to transport the solid material over long distances.

**slimes.** A product of wet crushing consisting of wet particles that will pass a 200-mesh screen.

**spalling.** Rock breaking off in layers parallel to the surface.

**starter dam.** Earthen dams built of borrow material to initiate construction of the tailings impoundment.

**standpipe piezometer.** A small well used to locate the water table.

**stope.** Step-like underground excavation for removal of ore in successive layers.

**stratabound.** A mineral deposit confined to a single layer, bed or stratum.

**stratum.** A section of a formation that consists of primarily the same rock type.

**study area.** Study areas may refer to those identified in ASARCO's baseline studies or to those used for the environmental analysis. The size of study areas depends on the resource under consideration. For example, the area examined in ASARCO's 1984-1985 wildlife baseline study. The intensive study area, 25 square miles, primarily was comprised of the proposed permit area. The extensive study area, 125 square miles, extended beyond the permit area including adjacent lands. Most survey efforts were concentrated within the intensive study area.

**subside.** Sink to the bottom; settle. (Subsidence.)

**tackifier.** An agent that binds seed, fertilizer, and mulch to a site, often used when seeding slopes.

**tailings slurry decant.** The liquid portion of the tailings slurry that remains after gravity settling in a tailings impoundment.

**threatened.** Any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, as identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

**toe dam.** A small dam located at the base of a larger embankment; usually to collect seepage or runoff.

**total suspended solids.** Undissolved particles suspended in liquid.

**transect.** A line, strip, or series of plots from which biological samples, such as vegetation, are taken.

**unconfined aquifer.** An aquifer in which there are no confining beds between the water table and the surface.

**unconsolidated.** Loose or soft.

**ungulate.** A hoofed mammal, such as deer or elk.

**upgradient.** A direction characterized by higher fluid potential or hydraulic head.

**variety class.** A particular level of visual variety or diversity of landscape character.

**A (distinctive).** Refers to areas where landforms, vegetative patterns, water features, and rock formations are of unusual or outstanding visual quality and are not common in the character type.
**B (common).** Refers to areas where landscape features contain some variety but tend to be common throughout the character type.
**C (minimal).** Refers to areas where landscape features have very little variety and high uniformity in form, line, color, and texture.

**viewer sensitivity.** The degree of viewer interest in the landscape's scenic quality.

**Level 1 (high).** At least 1/4 of users of primary travel routes, use areas, or water bodies, or at least 3/4 of users of secondary travel routes, use areas, or water bodies have major concern for scenic quality.
**Level 2 (moderate).** Less than 1/4 of users of primary travel routes or use areas, or between 1/4 and 3/4 of users of secondary travel routes or use areas have major concern for scenic quality.
**Level 3 (low).** Less than 1/4 of users of secondary travel routes or use areas have major concern for scenic quality.

**viewshed.** The portion of the surrounding landscape that is visible from a single observation point or set of points.

**visual quality objective.** A desired level of scenic quality based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

**zone of influence.** The area outside the physical workings of the mine and related facilities that is affected by noise, pollution, encroachment, or other disturbances caused by mining activities.

# CHAPTER 9

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## APPENDIX A - Definitions of Significance in NEPA/MEPA

### NEPA

### 40 CFR § 1508.27 Significantly

"Significantly" as used in NEPA requires considerations of both context and intensity:

(a) *Context.* This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) *Intensity.* This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions coming up about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
(2) The degree to which the proposed action affects public health or safety.
(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.
(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
(10) Whether the action threatens a violation of Federal, State, or Local law or

requirements imposed for the protection of the environment.

## MEPA

### ARM 26.2.644 Determining the Significance of Impacts

(1) In order to implement 75-1-201, MCA, the agency shall determine the significance of impacts associated with a proposed action. This determination is the basis of the agency's decision concerning the need to prepare an EIS and also refers to the agency's evaluation of individual and cumulative impacts in either EAs or EISs. The agency shall consider the following criteria in determining the significance of each impact on the quality of the human environment:

- (a) the severity, duration, geographic extent, and frequency of occurrence of the impact;
- (b) the probability that the impact will occur if the proposed action occurs; or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur;
- (c) growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts;
- (d) the quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values;
- (e) the importance to the state and to society of each environmental resource or value that would be affected;
- (f) any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions; and
- (g) potential conflict with local, state, or federal laws, requirements, or formal plans.

(2) An impact may be adverse, beneficial, or both. If none of the adverse effects of the impact are significant, an EIS is not required. An EIS is required if an impact has a significant adverse effect, even if the agency believes that the effect on balance will be beneficial. (History: Sec. 2-3-103, 2-4-201 MCA; IMP, Sec. 2-3-104, 75-1-201, MCA; NEW 1989 MAR p. 28, Eff. 1/13/89.)

# DRAFT BIOLOGICAL ASSESSMENT

of

# THREATENED, ENDANGERED, and PROPOSED SPECIES

for the

# ASARCO ROCK CREEK MINE

Cabinet Ranger District
Kootenai National Forest

1995

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as of:
Date: 06-09-95

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## APPENDIX B - BIOLOGICAL ASSESSMENT

**DRAFT** **DRAFT** **DRAFT** **DRAFT** **DRAFT**
06-09-95

BIOLOGICAL ASSESSMENT
of
Threatened, Endangered, and Proposed Wildlife Species
for the
ASARCO ROCK CREEK MINE

Cabinet Ranger District
Kootenai National Forest

## SUMMARY

### SUMMARY OF FINDINGS

Threatened, Endangered, and Proposed Species

Implementation of the proposed federal action will have **NO EFFECT** on water howellia. The project **IS NOT LIKELY TO ADVERSELY AFFECT** gray wolf, bald eagle, and peregrine falcon. The project **MAY ADVERSELY AFFECT** the grizzly bear.

### CONSULTATION REQUIREMENTS FOR THREATENED, ENDANGERED, AND PROPOSED SPECIES

In accordance with the Endangered Species Act and its implementing regulations and FSM 2671.4, Kootenai National Forest is required to request written concurrence from FWS with respect to the determination of potential effects on Gray Wolf, Bald Eagle, and Peregrine Falcon.

Formal Consultation is required with respect to the determination of potential effects on the Grizzly Bear.

Informal consultation is summarized in Appendix C.

### NEED FOR RE-ASSESSMENT BASED ON CHANGED CONDITIONS

The biological assessment findings are based on the best current data and scientific information available. If new information reveals effects that may impact threatened, endangered, or proposed species or their habitats in a manner or to an extent not considered in this assessment; if the proposed action is subsequently modified in a manner that causes an effect that was not considered in this assessment; or if a new species is listed or habitat identified that may be affected by the action, a revised biological assessment should be prepared.

## INTRODUCTION

This Biological Assessment addresses the potential effects of the proposed federal action on all threatened, endangered, and proposed species known or suspected to occur in the proposed action influence area. General life history information on these species is provided in Reel et al. (1989) and is incorporated by reference into this Biological Assessment.

Threatened, endangered, and proposed species are managed under the authority of the federal Endangered Species Act (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). The Endangered Species Act requires federal agencies to ensure that all actions which they "authorize, fund, or carry out" are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species. Conservation measures implemented to date for threatened, endangered, and proposed species by the Kootenai National Forest are listed in Appendix A.

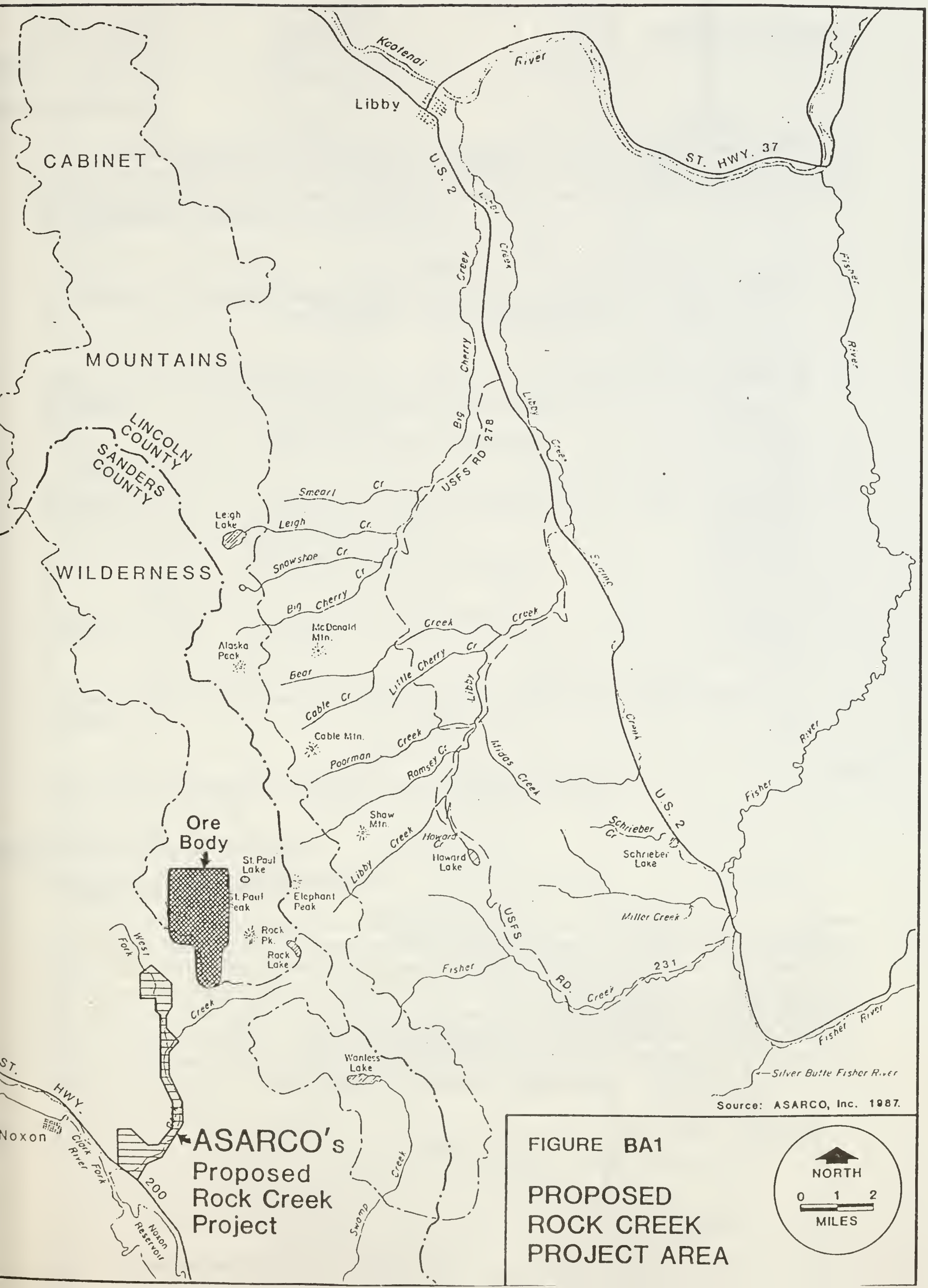
## DESCRIPTION OF PROPOSED ACTION

The proposed federal action consists of permitting ASARCO to construct and operate the Rock Creek Mine. The project lies in Compartment 711 of the Cabinet Ranger District in Sanders County, MT. The project area starts approximately 1 air mile east of Noxon, MT. Figure 1 is a vicinity map of the project area. Figure 2 is a detailed map of the proposed activity.

The proposed federal action is alternative number 4 as described in detail in the ASARCO ROCK CREEK MINE Environmental Impact Statement. The detailed description of the action from the EIS is provided in Appendix B. A summary of the proposed action is presented in Table 1.

**TABLE 1. Project Summary (Alternative 4)**

| | |
|---|---|
| Total acres in Analysis Area | 198,394 |
| Percent of Analysis Area Treated | 0.8 |
| Total acres in Permit Area | 1668 |
| Physically Disturbed Areas (Acres) | |
| Tailings Impoundment and Associated Features | 404 |
| Mill Site and Associated Features | 58 |
| Exploration Adit & Support Facilities | 10 |
| Transportation Corridors | 70 |
| TOTAL | 542 |
| Road Construction (miles) | 5.0 |
| Road Reconstruction (miles) | 13.8 |
| Project Duration (years) | 35 |

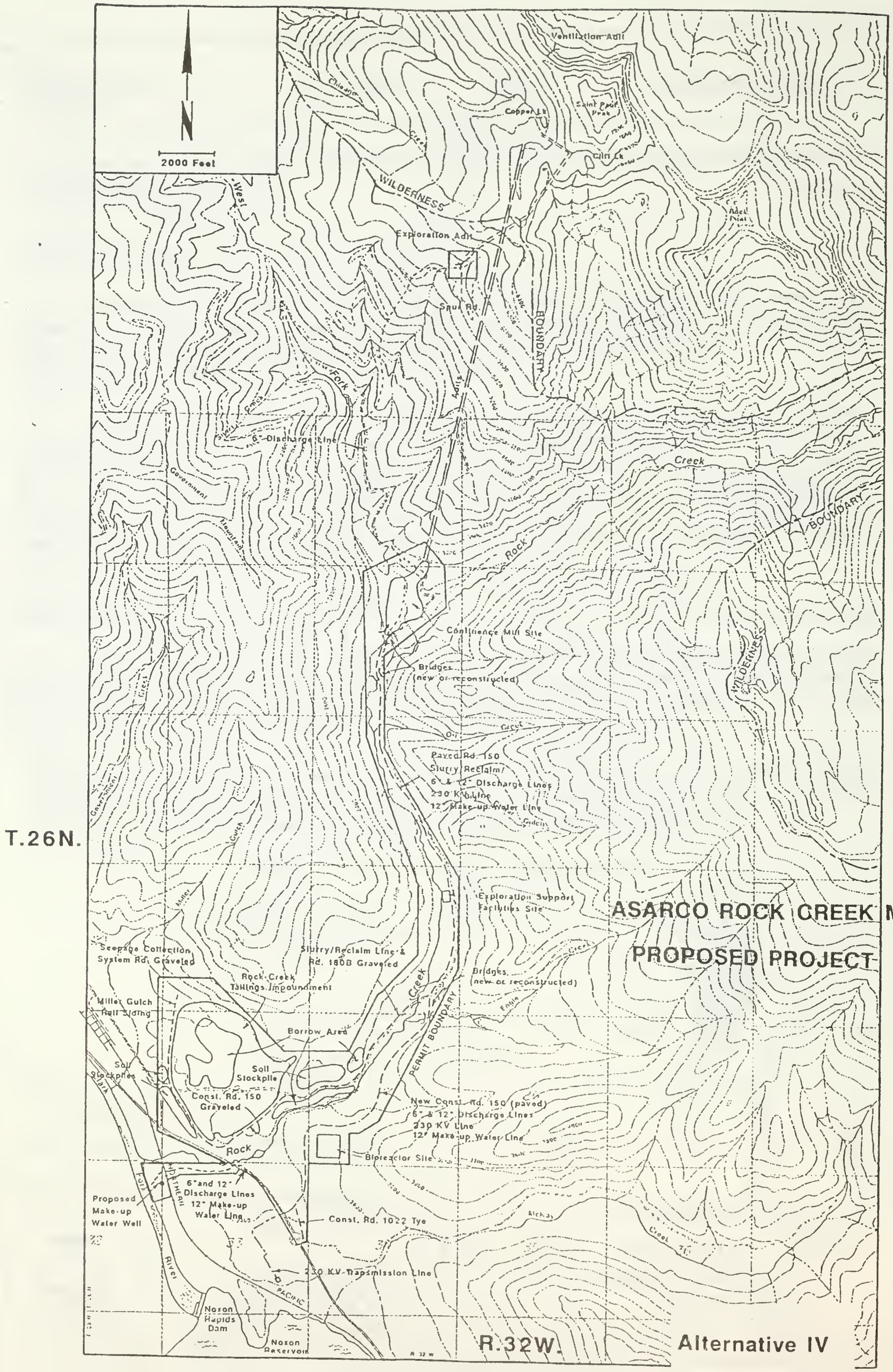


Source: ASARCO, Inc. 1987.

FIGURE BA1

PROPOSED ROCK CREEK PROJECT AREA

Figure BA2



ASARCO ROCK CREEK MINE

PROPOSED PROJECT

Alternative IV

## SPECIES LIST

A species list of proposed, threatened and endangered species known or suspected to occur in the project area was requested (7-22-94) and received (8-24-94) from the U.S. Fish and Wildlife Service (FWS) (Appendix C). Table 2 lists the threatened, endangered, and proposed species which may be within the influence area of this proposed project.

**TABLE 2.**
**Threatened, endangered, and proposed species known or suspected to occur within the influence area of the proposed action**

| Status | Name | Occurrence |
|---|---|---|
| Threatened: | Grizzly bear (*Ursus arctos horribilis*) | Resident |
| | Water howellia (*Howellia aquatilis*) | Unknown |
| Endangered: | Peregrine falcon (*Falco peregrinus*) | Resident |
| | Gray wolf (*Canis lupus*) | Transient |
| | Bald eagle (*Haliaetus leucocephalus*) | Resident |
| Category 1: | Bull trout (*Salvelinus confluentus*) | Resident |

An assessment of bull trout and other sensitive species is provided in a separate biological evaluation.

## THREATENED and ENDANGERED SPECIES ASSESSMENT

### BALD EAGLE

Description of Population and Habitat Status

The project planning area lies in the Upper Columbia Bald Eagle Recovery Zone of Montana (USFWS 1986; MBEWG 1991). Bald eagles use the Clark Fork River corridor year long. Over the past 10 years sightings have varied from 6 to 38 eagles during a yearly one day January eagle count. The count is done from vehicles along the lower Clark Fork River from Thompson Falls to the Idaho state line. Farmer and Heath (1987: p.119) reported a total of 16 sightings in their study area, with five birds the most seen in a single day. Figure BA-3 shows the historic bald eagle sighting locations, based on Farmer and Cabinet District records. Winter use level depends on ice conditions on the Noxon and Cabinet Gorge reservoirs. When the reservoirs freeze, the eagles leave.

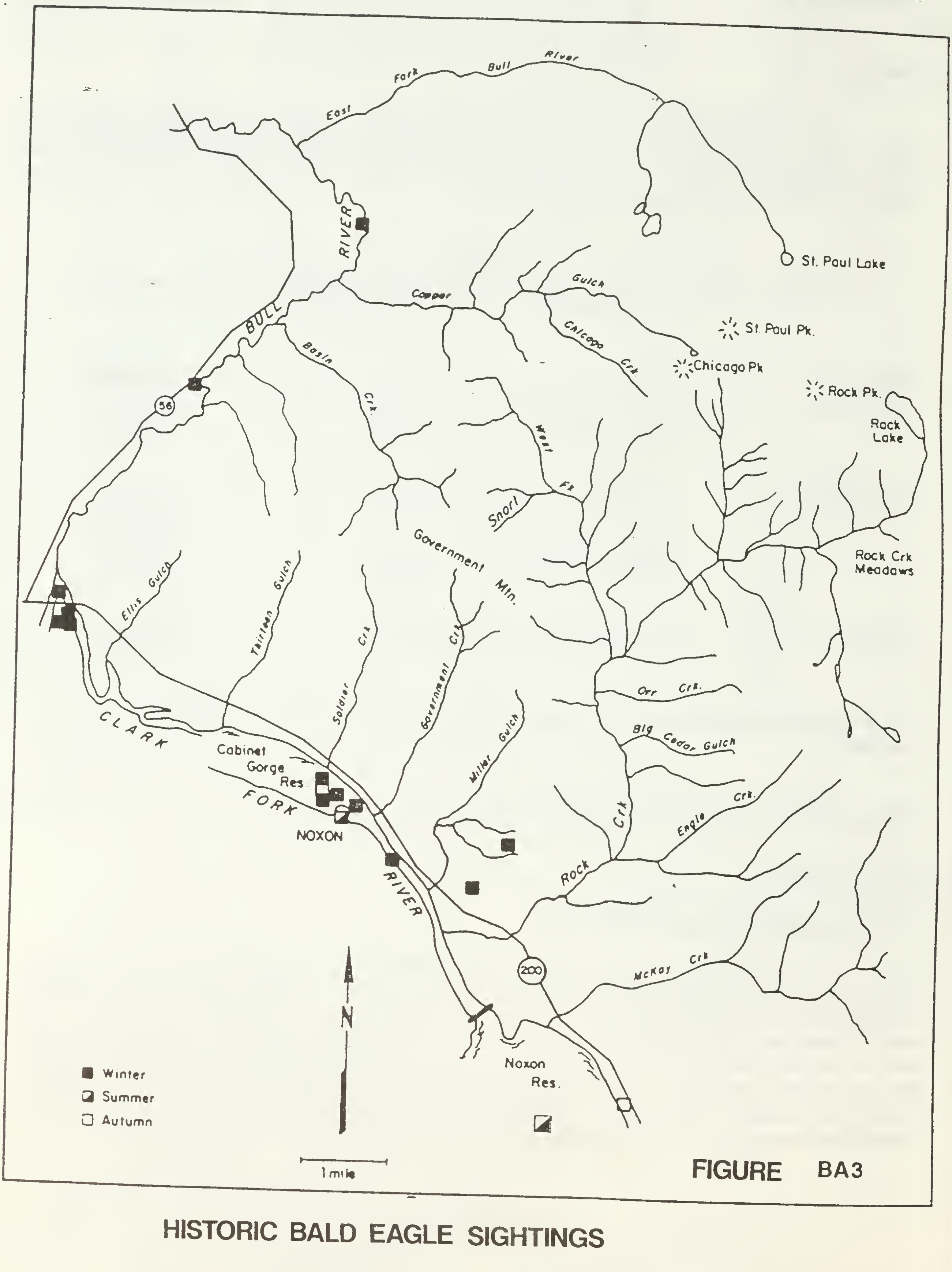


FIGURE BA3

HISTORIC BALD EAGLE SIGHTINGS

There are two bald eagle nests in the general area. One is about 3 air miles south of the proposed Rock creek tailings impoundment. This nest has been active since 1990 and has fledged young each year through 1994. The second nest was discovered in March of 1994. It is about 4 air miles west of the project area. The nest was occupied by a pair and the female started incubating eggs, but was unsuccessful in producing offspring in 1994.

Nesting habitat is described as the largest living trees, in a multi-storied stand, that is near a body of water that supports an adequate food base (USFWS 1986). The nest trees provide an unobstructed view of the foraging site(s). They have open crowns and sturdy limbs to support the massive eagle nests. There are no suitable nest trees (sites) in the ASARCO Rock creek mine project area.

Foraging for fish and waterfowl is done in the two reservoirs (Noxon and Cabinet Gorge) and the major tributary streams (Vermillion and Bull Rivers primarily). Scavenging is done along the railroad tracks and state highway 200, and perhaps Forest Development Road (FDR) 150.

Trees suitable as hunting perches generally have an unobstructed view of the hunting area, and are relatively close to the site. With the primary foraging area being the reservoirs, and the project area greater than one mile from the reservoir, there are no hunting perch sites in the project area. A known hunting perch does exist within 1/2 mile of the proposed Rock creek tailings impoundment. It lies between Highway 200 and the Clark Fork river.

### Analysis of Direct, Indirect, and Cumulative Effects

No activity is planned within 3.0 air miles of known bald eagle nest sites. All potentially suitable perching habitat along lower Rock creek and the Clark Fork river would be maintained.

Bald eagle foraging is done primarily in the Clark Fork river and associated reservoirs. The degree to which the project could effect the eagle is related to the predicted downstream effects on fish, the primary prey species. The draft environmental impact statement (DEIS, chapters 2 & 4) acknowledges a minor increase in some toxic metals which can increase stress to aquatic life. The downstream levels are determined to be negligible and unmeasurable (DEIS Table 2-14). Sediment and nitrogen loads would temporarily increase (DEIS Table 2-14) and this would impact aquatic invertebrates which could impact fish. The down stream impact is unmeasurable. The resultant indirect effect to bald eagles would also be unmeasurable. The water resources and aquatics/fisheries monitoring plans (DEIS Appendix H) are an integral part of the proposed action, and would be used to detect any adverse effects in the food chain used by bald eagles.

Bald eagle use along the Clark Fork river would continue to increase, as evidenced by the increase in nesting pairs over the past 5 years (from none to 4). Since there are no suitable nesting or wintering roost habitat in the project area, there would be no change in these habitat components. Foraging habitat along Highway 200, FDR 150, and the train tracks would potentially increase due to an expected increase in deer mortality from vehicle and train traffic needed for the proposed project. The increased food source could result in an increase in mortality risk to bald eagles scavenging on road kill.

Mitigation is planned that would remove dead animals from the right-of-way clearings on a daily basis. Mitigation should reduce the increased mortality risk back to existing levels.

### Statement of Findings

The proposed federal action is **not likely to adversely effect** the bald eagle or its habitat based on: 1) Distance to nearest nest site is greater than 2.5 miles (nesting territory radius); 2) No winter roost, nesting, or hunting perch habitat in the project area; and 3) Implementation of effective mitigation to reduce increased mortality risk.

## PEREGRINE FALCON

### Description of Population and Habitat Status

The proposed project area is part of the Rocky Mountain/Southwest population recovery zone (USFWS 1984). The peregrine falcon is a possible migrant/resident through the lower Clark Fork valley. There is one confirmed sighting (1993) approximately 4 air miles south of the proposed Rock Creek tailings impoundment. A second sighting was reported in May, 1994 by the Peregrine Fund. This sighting was a male (tagged and released from a Peregrine fund hack site) in the same area as the 1993 report. Surveys to determine nesting status were conducted over a 5 day period, without confirmation.

An important habitat component for peregrine falcon habitat is the availability of suitable cliffs for nesting (generally greater than 200 feet tall : USFWS 1984). The Peregrine Fund inventoried the Clark Fork drainage (including the Bull river) for such sites in 1989. They identified the cliffs west of Bull Lake and south of Noxon Reservoir (near Tuscor Hill) as potential nesting habitat (Bob Summerfield, KNF Wildlife Biologist, personal communication 10-12-93). The Bull lake cliffs are over 10 air miles northwest of the proposed project. The Tuscor Hill cliffs are 4 air miles south. Hamer (1976) identified the cliffs on Ibex and Scotty peaks as possible nesting habitat. These sites are approximately 12 air miles north of the planning area boundary. Marginal cliffs (less than 200 feet tall) are on the south side of Government Mountain (1 mile west or north). There is no suitable nesting habitat in the ASARCO Rock creek mine project area.

A historic aerie is located just across the state line in Idaho. Attempts are being made to reintroduce peregrines at that site (Bob Summerfield, KNF wildlife biologist, personal communication 10-12-93).

A peregrine prey base (waterfowl and small birds) exists on the Cabinet Gorge and Noxon reservoirs and the surrounding sloughs and wetlands.

### Analysis of Direct, Indirect, and Cumulative Effects

Peregrine falcon use along the Clark Fork river would remain a possibility. The suitable and marginal nesting habitat would still be available. The likelihood of a nesting pair moving into the area would be fair, due to the presence of nesting bald eagles near suitable peregrine nesting habitat. Bald eagles defend their nest territories against other raptors, which tends to discourage other raptor species from nesting in the vicinity of bald eagle nests. The use of the area by migrating peregrines could still occur.

Since the planning area contains no suitable nesting habitat and activity is at least 3 miles from potential nesting habitat, the proposed project would have no direct, indirect or cumulative impacts on peregrine falcon reproduction. Peregrines migrating in the fall could be displaced from any migration route that passes through the lower slopes of Rock Creek.

### Statement of Findings

The proposed federal action is **not likely to adversely affect** the peregrine falcon or its habitat based on: 1) Absence of occupied nest sites and 2) No documented sightings in the project area.

### Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

Should any peregrine falcon nest sites be found within 1 mile of proposed activities, restrict activities (in excess of those which have historically occurred at the site) between February 1 and August 31 (USFWS 1984).

## GRAY WOLF

### Description of Population and Habitat Status

The project area lies outside the Northern Rocky Mountain Wolf Recovery Area (USDI 1987). The area is about 16 air miles east of a potential dispersal corridor that runs along the Idaho-Montana border (delineated in the Wolf Recovery Plan: USDI 1987, pg. 23). The gray wolf is a potential resident in the lower Clark Fork valley. There are two unconfirmed sightings (1991) 1 mile west of the proposed ASARCO Rock Creek tailings impoundment. There is a 1979 unconfirmed sighting 1 mile east of the proposed mill site. There are three unconfirmed 1994 reports of a pack (3 animals) using the Pillick Ridge/Blue creek area, which is 7-15 air miles northwest of the project area. Information suggests a high probability of wolves west of the project area.

An adequate prey base of elk and deer exists in the area to contribute to the support of a wolf pack. The National Forest portion of the project area downstream from Engle creek is allocated to big game winter range.

Den sites are generally greater than one mile from open roads or trails and one to two miles from camp sites (USFWS 1987: p.73). These sites are normally on southerly aspects, on moderate slopes, within 400 yards of surface water, and at an elevation overlooking surrounding low-lying areas. There are no known den sites in the Rock creek drainage.

Rendezvous sites (resting and gathering areas) are usually complexes of meadows and adjacent timber, with surface water nearby (USFWS 1987: p.73). They tend to be away from human activity and on drier sites that are slightly elevated above riparian areas. There are no known rendezvous sites in the Rock creek drainage.

A major component of wolf habitat is sufficient space with minimal exposure to humans (USFWS 1987: p.7). Space is discussed in the section on grizzly bear.

### Analysis of Direct, Indirect, and Cumulative Effects

The increase in human activity (operations 7 days a week for up to 30 years) would effectively eliminate the suitability of the stream bottom portion of Rock creek for use by wolves. The increased potential for human/wolf encounters would result in a greater mortality risk for wolves entering the Rock creek drainage. Mitigation, car pooling mine employees and not allowing firearms in ASARCO vehicles, should be effective at offsetting the increase in mortality risk. The closure of roads to meet ORD standards for grizzly bear would benefit wolves (see section of grizzly).

Prey base habitat and population potential would remain essentially the same. As there are no known den or rendezvous sites in the planning area the proposed project would not affect this habitat component. Should wolves attempt to use the area during operations, they would be displaced by mining activities (i.e., mill site, hauling, tailings impoundment work). Displacement habitat would be available (see section on grizzly bear). Corridors connecting the project area to displacement habitat would be intact, except for the reduced effectiveness of the corridor between bear analysis areas 7-6-1, 7-5-2 and 7-4-7. This reduced effectiveness is due to the increased traffic level on forest road 150. Mitigation calling for car pooling would partially offset this effect.

### Statement of Findings

The proposed federal action is not likely to adversely affect the gray wolf or its habitat based on: 1) Absence of confirmed wolf sightings in the area; 2) The area is outside designated recovery area; 3) No known den or rendezvous sites in the area; and 4) Implementation of effective mitigation measures as part of the project design (car pooling, no firearms, road closures).

### Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment determined that the proposed action is not like to adversely affect the gray wolf. No additional mitigation required as measures are part of project design.

## GRIZZLY BEAR

### Description of Population and Habitat Status

The proposed project lies in the Cabinet-Yaak recovery zone (USFWS 1993). The current population estimate for this ecosystem is 20 grizzly bears (Wayne Kasworm, USFWS, personal communication 7-19-94). The present Cabinet Mountains population is thought to be old-aged and on the decline (Kasworm and Manley 1988). There have been four young female grizzlies transplanted into the Cabinet Mountains from Canada over the past five years. One of these transplants has since died from undetermined causes.

The analysis area for grizzlies covers Bear Management Units (BMUs) 4 (Bull), 5 (St.Paul), and 6 (Wanless) (Figure BA-4). Project activities would occur in Bear Analysis Areas (BAAs) 7-4-7, 7-5-2, 7-5-3, and 7-6-1. Table 3 summarizes reports of grizzlies in these BAAs since 1960.

**Table 3.**
**Grizzly Reports Between 1960 and 1993.**

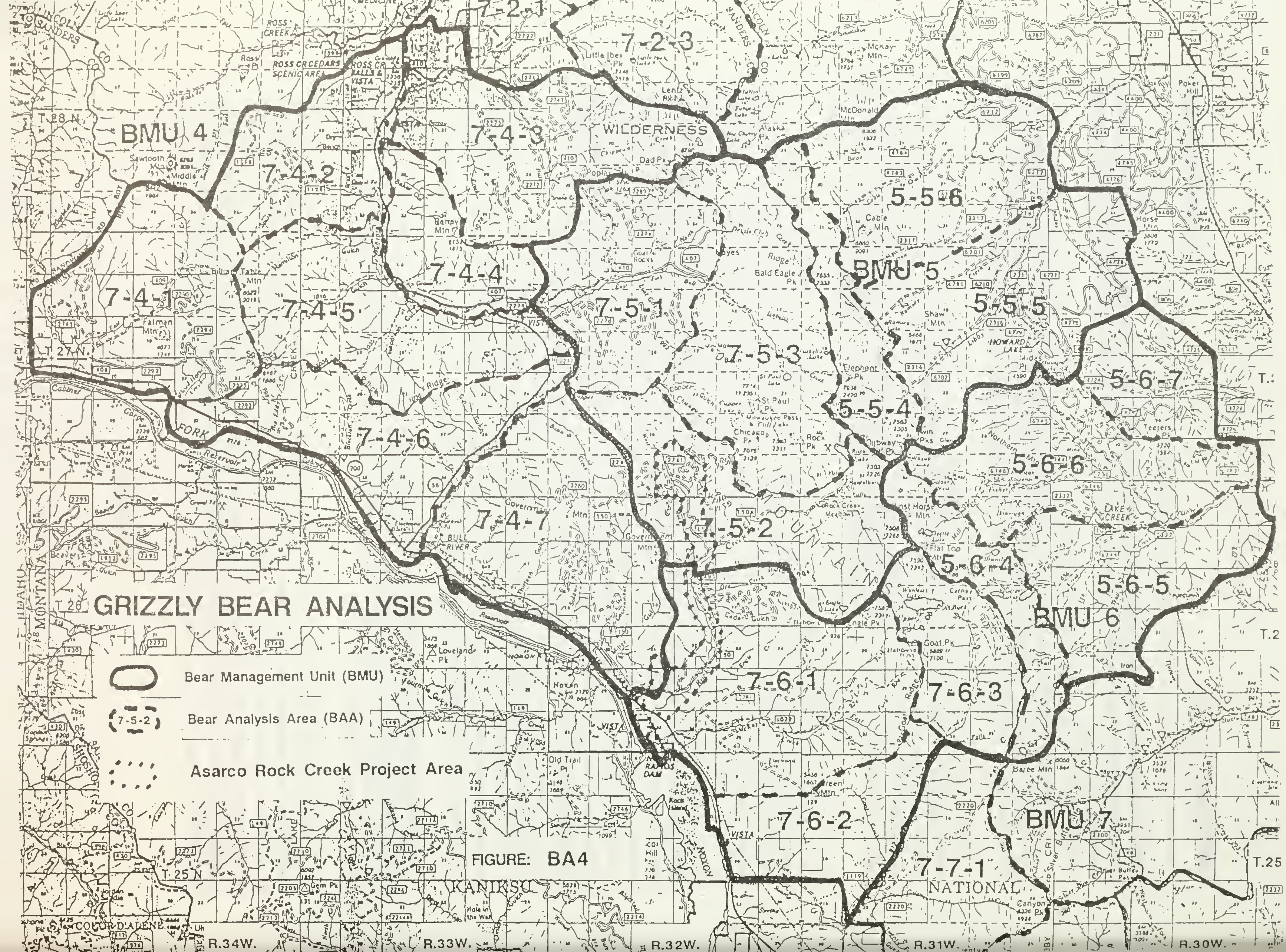
| BAA | Visual Sightings (1960-1993) | Radio Locations (1983-1993) | Mortality (1975-1993) |
|---|---|---|---|
| 7-4-7 | 8 | 1 | 0 |
| 7-5-2 | 7 | 6 | 1 |
| 7-5-3 | 5 | 21 | 0 |
| 7-6-1 | 4 | 7 | 0 |

Habitat components important to grizzly bear have been mapped for the proposed project (Analysis File at KNF Supervisors Office). Table 4 summarizes the acres of each component in the project influence zone. Grizzlies select habitat types rich in herbaceous foods in spring and early summer. Late summer and fall habitat is dominated by sites with abundant huckleberry fields (Erickson et al. 1987). There are no large huckleberry fields in the project area. Huckleberry production in the project area is probably declining due to closing forest canopies. The Rock creek drainage provides about the same proportion of key habitat components as other areas of the Cabinet mountains.

Grizzly denning habitat is generally above 5200 feet in elevation and on north and west aspects in the Cabinet mountains (Kasworm and Thier 1992: 40 and 1993: 44). The Rock creek drainage does contain potentially suitable denning habitat, but none exists in the ASARCO Rock Creek Mine project area. There are no known den sites in the Rock creek drainage.

Habitat effectiveness or percent of the area free from human disturbance is one of the elements of bear habitat modeling. The existing habitat effectiveness of each BMU is: BMU 4 - 62.3%, BMU 5 - 73.9%, and BMU 6 - 70.8%. BMUs 5 and 6 meet the desired 70% minimum level of free space, as defined by model developers.

The Kootenai Forest Plan (USDA 1987) establishes a maximum open road density (ORD) standard on areas managed for grizzly bear of 0.75 miles per square mile. This same objective applies to each BAA. Recent research (Mace and Manley 1992) indicate that total road density (TRD) may also be an important factor in habitat suitability for grizzly bear. Table 5 displays the existing situation for open and total road density in each Bear Analysis area where the project would be active, or used for a displacement area.



GRIZZLY BEAR ANALYSIS

FIGURE: BA4

### Table 4.
### Acres of Existing Habitat Components, by BMU, Within the ASARCO Rock Creek Mine Project Influence Zone

| Habitat Component | BMU 4 | BMU 5 | BMU 6 | Total |
|---|---|---|---|---|
| Mixed Alder field & rock | | 61 | | 61 |
| Forb field | | | 82 | 82 |
| Mixed forb field & rock | | | 244 | 244 |
| Grass sidehill park | 16 | 6 | 10 | 32 |
| Huckleberry shrub field | | 277 | | 277 |
| Mixed shrubfield | 22 | 155 | 174 | 351 |
| Mixed shrubfield & grass | | | 214 | 214 |
| Riparian stream bottom | | 16 | 54 | 70 |
| Rock | | | 2177 | 2177 |
| Wet Meadow | | | 5 | 5 |
| Beargrass sidehill park | | 152 | | 152 |
| Coniferous forest | 269 | 2163 | 14205 | 16745 |
| Harvest Units (clearcut) | ___ | 176 | ___ | 176 |
| Total Area | 307 | 5291 | 14988 | 20586 |

### Table 5.
### Existing Road Density (Miles per square mile) Summary

| ACTIVE BAA | | | DISPLACEMENT BAA | | |
|---|---|---|---|---|---|
| BAA | ORD | TRD | BAA | ORD | TRD |
| 7-4-7 | 0.89 | 1.06 | 7-4-5 | 0.00 | 0.20 |
| | | | 7-4-6 | 0.00 | 1.16 |
| 7-5-2 | 0.79 | 0.80 | 7-5-1 | 0.56 | 1.01 |
| | | | 7-5-3 | 0.00 | 0.00[1] |
| 7-6-1 | 0.78 | 1.50 | 7-6-2 | 0.00 | 0.86 |
| | | | 7-6-3 | 0.00 | 0.00 |

[1] BAA 7-5-3 has minor surface activity during construction of ventilation adit, but then is available for displacement.

The project area lies in Management Situation 1 (MS1) (necessary for the recovery of the species), and Management Situation 3 (MS3) lands (grizzly use may occur, but such use is not encouraged - to prevent conflicts with human use or occupancy). Private (non-corporate) land and lands within 1/4 mile of private lands along state highway 200 are in Management Situation 3.

### Analysis of Direct, Indirect, and Cumulative Effects

Construction and operation of the mine, mill and associated activities would have direct, indirect and cumulative effects on the grizzly bear and its habitat. Direct effects are those on-site activities which alter habitat, displace bears from habitat normally used, or affect the productivity, survival or mortality of the grizzly. Indirect effects are those activities that take place off-site (beyond the permit area) and are not directly tied to the operation of the mine. Indirect effects can also affect productivity, survival or mortality of grizzlies. Housing development and recreation activity are examples of indirect effects. Cumulative effects result from the combination of effects from past, present and other foreseeable future projects.

A cumulative effects analysis process was developed for the Cabinet/Yaak ecosystem (USDA et al. 1988). This process is referred to as the Cumulative Effects Model, or CEM for short. This CEM looks at habitat conditions and all human activities that could displace or result in bear mortality. The details of this process are summarized in appendix D. The results of the CEM analysis are included in the rest of this section.

Table 6 displays the distribution of major activities in the Bull, St. Paul and Wanless bear management units.

Although the project effects on habitat effectiveness are relatively small (Table 7A), the proposed project does not meet Forest direction for cumulative habitat effectiveness (70% in each BMU) for two of the BMUs (Table 7B).

Grizzly bear would be displaced from the project area during all phases of the proposed project (exploration, construction, and operation). Displacement habitat would be provided in adjacent BAAs (see Table 10). The greatest displacement factor would be the perpetual operations (7 days a week, 24 hours a day).

Grizzly habitat would be physically changed on 542 acres by the construction of the mill site, tailings impoundment, utility and road corridors and placement of excavated material at waste and storage sites. In addition, the presence of humans, during construction would influence grizzly use on an additional 2390 acres of habitat within 1/4 to 1/2 mile of physically disturbed sites and human travel routes. During operations the disturbance acres would only be 2,150. A portion of the area influenced by the proposed project presently experiences some human disturbance. Disturbance would generally be much greater with the proposal because of intensity (7 days a week). Table 7B summarizes the cumulative reduced habitat effectiveness by BMU.

### Table 6.
### Temporal/spatial distribution of major activities in Bull, St.Paul, and Wanless BMUs[1]

| Bear Analysis Area | Present Activity | Projected Major Activity | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1995 | 1996 | 1997 | 1998 | 1999 | 2000-30 |
| 7-6-1 | BI | L | A | AX | ACY | CY | Z |
| 7-6-2 | — | — | — | — | — | — | — |
| 7-6-3 | — | — | — | — | — | — | — |
| 5-6-4 | — | — | — | — | — | — | — |
| 5-6-5 | — | — | — | — | — | — | — |
| 5-6-6 | Q | Q | — | — | — | — | — |
| 5-6-7 | R | KR | KR | | — | — | — |
| 7-5-1 | DFG | DF | E | — | — | — | — |
| 7-5-2 | — | — | — | X | Y | Y | Z |
| 7-5-3 | — | — | — | X | Y | — | — |
| 5-5-4 | — | — | — | — | — | — | — |
| 5-5-5 | — | | P | P | P | P | P |
| 5-5-6 | — | | P | P | P | P | P |
| 7-4-1 | — | 0 | — | — | — | — | — |
| 7-4-2 | — | — | — | — | — | — | — |
| 7-4-3 | B | H | H | H | — | — | — |
| 7-4-4 | — | H | H | H | — | — | — |
| 7-4-5 | — | M | — | — | — | — | — |
| 7-4-6 | — | — | — | — | — | — | — |
| 7-4-7 | J | NJ | J | JX | Y | Y | Z |

[1] Each letter represents a separate major activity as shown below. Activities are included in cumulative effects analysis.

A = Cedar Gulch Timber Sale
B = ASARCO logging of private land
C = Cedar Gulch Timber Sale site prep and reforestation (counted as major activity due to helicopter use)
D = Lost Girl Timber Sale
E = Lost Girl Timber Sale site prep and reforestation
F = North Sorrel Heli Timber Sale
G = Bull Devil Timber Sale
H = Berray Mountain Timber Sale
I = J&N Private Logging
J = MFP Private Logging
K = Noranda Montanore Powerline
L = McKay Miller SSTS
M = Pilik Horse SSTS
N = Government Road SSTS
0 = Fat Eddie Timber Sale
P = Noranda MONTANORE mine project
Q = Corral Salvage Timber Sale
R = Miller Creek Timber Sale
X = ASARCO Rock Creek Mine Exploration
Y = ASARCO Rock Creek Mine Construction
Z = ASARCO Rock Creek Mine Operation

Denning habitat, as described by Kasworm and Thier (1992 pg.40 and 1993 pg.44), would not be disturbed by the proposed project.

### Recovery Objectives Analysis

The goal for grizzly bear management on the Kootenai National Forest is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. An integral part of the goal is to implement measures within the authority of the Forest Service to minimize human-caused grizzly bear mortalities.

This goal is accomplished by achieving certain objectives relative to grizzly bear recovery (Harms 1990). A number of measures are used to gauge whether the objectives are being met. These measures include Forest Plan standards and guidelines and other measures developed through consultation with U.S. Fish and Wildlife Service. The following analysis describes the potential effects, including cumulative effects of the proposed action by examining how these measures are implemented and, thus, how the objectives relating to grizzly bear recovery are met.

Objective 1. **Provide adequate space to meet the spatial requirements of a recovered grizzly bear population.**

Spatial requirements are achieved by implementing three Forest Plan standards. The first standard, application of the cumulative effects analysis process (Christensen and Madel 1982), demonstrates that the amount of available bear habitat is below the minimum threshold of 70 percent in two of the three affected Bear Management Units (BMU). This figure is referred to as habitat effectiveness or available space (see Tables 7A and 7B).

**TABLE 7A.**
**Reduction in grizzly bear habitat effectiveness (H.E) in the Bull, St.Paul, and Wanless BMUs due to ASARCO Rock creek mine**

| | Alt. | BMU 4<br>% | BMU 5<br>% | BMU 6<br>% |
|---|---|---|---|---|
| * | 4 | -0.8 | -2.0 | -1.1 |

* figures do not translate directly to % shown in table 7B because 7B includes all other projects effects (cumulative)

### TABLE 7B.
### Cumulative Grizzly bear H.E. in the Bull, St.Paul and Wanless BMUs before, during, and after the proposed action

| | Existing Situation % H.E. | During Proposed Action % H.E. | | | | | | After Proposed Action % H.E. |
|---|---|---|---|---|---|---|---|---|
| | 1994 | 95 | 96 | 97 | 98 | 99 | 2000+ | 2035 |
| BMU 4 | 62.3 | 64.8 | 64.3 | 64.3 | 64.3 | 64.3 | 64.3 | 64.8 |
| BMU 5 | 73.9 | 63.1 | 66.5 | 66.3 | 66.3 | 66.3 | 67.2 | 67.4 |
| BMU 6 | 70.8 | 71.4 | 72.6 | 71.2 | 71.2 | 71.2 | 71.2 | 72.0 |

The second standard sets a maximum open road density of 0.75 linear miles of open road per square mile of habitat within each affected Bear Analysis Area. Table 8 displays ORD by Bear Analysis Area.

The road densities displayed in Table 8 do not reflect the impacts of administrative use. The 1993 Grizzly Recovery Plan (pg. 148) recommends that administrative use not exceed 14 days during the time bears are out of the den (about April 1 to November 14). A bear does not differentiate between public or administrative use and may thus avoid administratively used roads. An analysis of open road density was done for the BAAs where ASARCO activities would take place. Data from the 1992, 1993 and 1994 administrative gate permits were analyzed. The results are displayed in Table 9. With administrative use, none of the BAAs meet 0.75 ORD.

The third standard provides that a 5,000 - 15,000 acre displacement area (an area meeting all standards and containing no major activities) be provided adjacent to each Bear Analysis Area containing a major activity. Table 10 shows the displacement schedule.

To assure in-kind habitat in the displacement areas an analysis was conducted on each BAA to determine the available acres by aspect (N,S,E,W) in two elevation zones (above and below 5,000 feet) (Table 11). This analysis method has been determined to be adequate for a displacement analysis (Kevin Shelly, USFWS, personal communication 11-19-93).

The displacement analysis shows that it will take more than one BAA to provide displacement habitat for habitat lost due to activities in BAA 7-6-1 and 7-4-7. Two BAAs (7-6-2 and 7-6-3) will be required to provide displacement habitat for 7-6-1. Likewise, 7-4-7 will require two displacement areas (7-4-5 and 7-4-6). Displacement for 7-5-2 will be provided in 7-5-3. The displacement areas will not have any major activity in them for the life of ASARCO's Rock Creek Mine (see Tables 6 and 10). The end result would be undisturbed displacement areas that provide 177 acres (below 5000 feet) and 7,452 acres (above 5000 feet) more than is available in BAAs where proposed project is planned.

## Table 8.
## Open-road density (linear miles road/square mile) for BMUs 4, 5, and 6 by Bear Analysis Area (MS-1 lands only)

| Bear Analysis Area | Existing Situation | During Prop. Action | | After Prop. Action |
|---|---|---|---|---|
| | 1994 | 1997 | 1998 1999 2000-30 | 2035 |
| 7-4-1 | 0.12 | 0.12 | ------------------> | 0.12 |
| 7-4-2 | 0.31 | 0.31 | ------------------> | 0.31 |
| 7-4-3 | 0.61 | 0.61 | ------------------> | 0.61 |
| 7-4-4 | 0.00[1] | 0.00 | ------------------> | 0.00 |
| 7-4-5 | 0.00[1] | 0.00 | ------------------> | 0.00 |
| 7-4-6 | 0.00 | 0.00 | ------------------> | 0.00 |
| 7-4-7* | 0.89 | 0.62 | ------------------> | 0.62[3] |
| 7-5-1 | 0.57 | 0.57 | 1-----------------> | 0.57 |
| 7-5-2* | 0.79 | 0.75 | ------------------>[6] | 0.75 |
| 7-5-3 | 0.00 | 0.00 | ------------------> | 0.00 |
| 5-5-4 | 0.00 | 0.00 | ------------------> | 0.00 |
| 5-5-5 | 1.24 | 0.75 | ------------------>[2] | 0.75 |
| 5-5-6 | 0.74 | 0.74 | ------------------> | 0.74 |
| 7-6-1* | 0.78 | 0.75 | ------------------>[5] | 0.75 |
| 7-6-2 | 0.00[1] | 0.00 | ------------------> | 0.00 |
| 7-6-3 | 0.00 | 0.00 | ------------------> | 0.00 |
| 5-6-4 | 0.00 | 0.00 | ------------------> | 0.00 |
| 5-6-5 | 0.26 | 0.26 | ------------------> | 0.21 |
| 5-6-6 | 1.13 | 0.75 | ------------------>[4] | 0.75 |
| 5-6-7 | 0.76 | 0.76 | ------------------> | 0.76 |

*BAA where ASARCO Rock Creek Mine active

[1] All road activity in Management Situation 3

[2] ORD reduced to 0.75 with NORANDA Montanore Mine project

[3] ORD reduced to 0.62 with closure of 4.3 miles of corporate roads (scheduled 1997)

[4] ORD reduced to 0.75 with Corral Salvage Timber Sale (~1995-96)

[5] ORD reduced to 0.75 with Cedar Gulch Timber Sale (~1997)

[6] ORD reduced to 0.75 with closure of 2.5 miles of road 2741

## TABLE 9.
## Open Road Densities by BAA including Administrative use[1]

| Bear Analysis Area | Without Admin. Use | | | With Administrative Use | | |
|---|---|---|---|---|---|---|
| | 1992 | 1993 | 1994 | 1992 | 1993 | 1994[2] |
| 7-4-7 | 0.89 | 0.89 | 0.89 | 1.07 | 0.98 | 0.98 |
| 7-5-1 | 0.52 | 0.52 | 0.57 | 1.05 | 1.05 | 1.05 |
| 7-5-2 | 0.78 | 0.78 | 0.79 | 0.78 | 0.78 | 0.79 |
| 7-6-1 | 0.76 | 0.76 | 0.76 | 1.03 | 1.03 | 1.03 |

[1] Admin. use counted as open road when days used exceeded 14 per year.

[2] 1994 projected value using administrative use as of 7-20-94.

## TABLE 10.
## Displacement area scheduling in BULL, ST.PAUL and WANLESS BMUs

| Year | Active BAA | Displacement BAA | Purpose |
|---|---|---|---|
| 1995 | 7-5-1 | 7-5-3 | Lost Girl TS |
| | 5-5-5 | 5-5-6 and 5-5-4 | Noranda Montanore Mine |
| | 5-5-6 | 5-5-6 and 5-5-4 | Noranda Montanore Mine |
| | 7-4-3 | 7-2-3 | Berray Mtn. TS |
| | 7-4-4 | 7-4-2 | Berray Mtn. TS |
| | 7-4-7 | 7-4-6 | Private Logging (MFP) |
| | 7-6-1 | 7-6-2 | Cedar Gulch TS |
| | 5-6-5 | 7-6-3 | Corral Salvage TS |
| | 5-6-7 | 5-6-6 | Noranda Powerline |
| 1996 | Same as 1995 | | |
| 1997 | 7-4-3 | 7-2-3 | Berray Mtn. TS |
| | 7-4-4 | 7-4-2 | Berray Mtn. TS |
| | 7-6-1 | 7-6-2 | Cedar Gulch TS |
| | 7-6-1 | 7-6-2 and 7-6-3 | ASARCO Rock Cr Mine |
| | 7-5-2 | 7-5-3 | " |
| | 7-4-7 | 7-4-5 and 7-4-6 | " |
| | 5-5-5 | 5-5-6 and 5-5-4 | Noranda Montanore Mine |
| | 5-5-6 | 5-5-4 and 5-5-6 | Noranda Montanore Mine |
| 1998 | Same as 1997 | | |
| 1999-2020 | 7-6-1 | 7-6-2 and 7-6-3 | ASARCO Rock Cr Mine |
| | 7-5-2 | 7-5-3 | " |
| | 7-4-7 | 7-4-5 and 7-4-6 | " |
| | 5-5-5 | 5-5-6 and 5-5-4 | Noranda Montanore Mine |
| | 5-5-6 | 5-5-4 and 5-5-6 | Noranda Montanore Mine |
| 2020-2030 | 7-6-1 | 7-6-2 and 7-6-3 | ASARCO Rock Cr Mine |
| | 7-5-2 | 7-5-3 | " |
| | 7-4-7 | 7-4-5 and 7-4-6 | " |

**Table 11. Displacement Habitat Acres by Elevation Zone and Aspect**

| Aspect | Elevation | Active Area | Displacement Area | Difference |
|---|---|---|---|---|
| North | < 5000 ft. | 7225 | 6928 | - 297 |
| | > 5000 ft. | 1812 | 3274 | + 1462 |
| | | | | + 1165 |
| West | < 5000 ft. | 12884 | 7888 | - 4996 |
| | > 5000 ft. | 5300 | 5971 | + 671 |
| | | | | - 4325 |
| East | < 5000 ft. | 4649 | 9228 | + 4579 |
| | > 5000 ft. | 1488 | 4624 | + 3136 |
| | | | | + 7715 |
| South | < 5000 ft. | 9289 | 10180 | + 891 |
| | > 5000 ft. | 2695 | 4878 | + 2183 |
| | | | | + 3074 |

Active Area = BAAs with active ASARCO project (7-4-7, 7-5-2, and 7-6-1)
Displacement Area = BAAs 7-6-2, 7-6-3, 7-5-3, 7-4-5, 7-4-6

Objective 2. **Manage for an adequate distribution of bears across the ecosystem.**

Grizzly bear habitat on the Kootenai National Forest is managed according to the Bear Management Unit (BMU) concept (Christensen and Madel 1982) for purposes of managing cumulative effects of human activities. This management concept potentially provides for an adequate distribution of bears by delineating BMUs (averaging about 100 square miles) and applying specific land management guidance to ensure compatibility with grizzly bears. BMUs are further broken down into Bear Analysis Areas (BAAs) (5,000 to 15,000 acres in size) for evaluation and application of measures to ensure adequate distribution of bears. Each BAA in the Bull, St.Paul, and Wanless BMUs were analyzed for five standards to determine if the distribution objective is being met.

1. Opening size -- Proposed harvest units, either individually or in combination with existing unrecovered units should normally be designed to be ≤40 acres. Where the 40 acre limitation is exceeded for justifiable reasons, no point in the resultant opening should be more than 600 feet from cover (i.e. maximum 1200 foot opening width.)

   The largest proposed opening would be 404 acres, from the tailing impoundment (private land). The mill site would require an opening of 58 acres.

2. Movement corridors -- Unharvested corridors ≥600 feet in width should be maintained between proposed harvest units and between proposed and unrecovered existing harvest units.

Timbered corridors equal to or greater than 600 feet would be maintained between all created openings.

The increased traffic level on FDR 150 would greatly reduce the effectiveness of the movement corridor between BAAs 7-6-1, 7-5-2 and 7-4-7. This reduction in corridor effectiveness would be partially offset by the required mitigation to develop a transportation plan that minimizes mine related traffic.

3. Seasonal components -- Schedule proposed mine activities to avoid known spring habitats during the spring-use period (April 1 to June 15) and known denning habitats during the denning period (November 15 to April 15.)

   Since operations are planned 7 days a week, year round, the project would not avoid activity on spring habitat during the spring use period.

   Habitat unit (HU) analysis was done using the CEM for grizzly (USDA FS 1988). The calculations were completed by hand. Early (4/1 to 7/31) and late (8/1 to 11/30) habitat unit values were calculated and the effects (physically altered or disturbed by human activity) were determined (see appendix D for process details). The proposed project would effect 2,244.2 early HUs (2.61 HUs per acre) and 1,226.8 late HUs (1.61 HUs/ac.). This equates to an over all habitat value (OHV) of 2.11. "In kind" replacement habitat (2,303 acres) would be required as specified in the mitigation plan (Appendix E).

4. Open-road densities -- Refer to discussion under objective 1.

5. Displacement areas -- Refer to discussion under objective 1.

Objective 3. **Manage for an acceptable level of mortality risk.**

There has been one documented grizzly bear mortality in the St. Paul BMU. The 1992 transplanted female was found dead of undetermined cause. This bear was known to have a cub of the year, which is assumed to be dead.

Most human-caused grizzly bear mortalities on the Kootenai National Forest have resulted from interactions between bears and big game hunters (Kasworm and Manley 1988). Grizzly bear vulnerability to human-caused mortality is partially a function of habitat security. Therefore, mortality can be partially managed by the application of standards which are designed to maintain or enhance habitat security. These standards have previously been discussed for objectives 1 and 2: 70 percent habitat effectiveness threshold, opening size, movement corridors, cover requirements, seasonal components, and open-road density.

It is important to note that human-caused grizzly bear mortality is also a function of other factors, such as the regulation of big game hunting, which are beyond the authority of the Forest Service to control. Regulation of hunting is the responsibility of the State of Montana.

Actions specifically taken in the design of this proposed project to minimize the risk of grizzly bear mortality include: 1) closure of new roads to the public during operations, followed by yearlong closure to all persons after project completion. 2) No firearms in ASARCO employee's vehicles when traveling to and from work. 3) Transportation plan minimizes mine related traffic.

Objective 4. Maintain/improve habitat suitability with respect to bear food production.

There are no actions specifically taken in the design of this proposed action to maintain or improve the production of bear foods. Maintenance would come through "in kind" replacement for habitat lost due to physical disturbance (see mitigation plan in appendix E).

Objective 5. Meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for management situations 1, 2, and 3.

The previously described Forest Plan standards and guidelines have been determined to meet the intent of the Interagency Grizzly Bear Guidelines (Buterbaugh 1991). Since the proposed project does not meet all Forest Plan standards and guidelines (specifically ORD and %HE in all BAAs), the intent of the Interagency Grizzly Bear Guidelines is not met, without additional measures (see measures below).

Statement of Findings

The proposed federal action may adversely affect the grizzly bear and its habitat based on 1) Forest Plan standards and guides for grizzly are not met: including Open Road Density (< 0.75 mi/sq.mi.) and percent habitat effectiveness (> 70%); 2) While direct Habitat loss is mitigated, it may not be possible to achieve "in kind" replacement due to {a} unwilling sellers, {b} insufficient acres available in the disturbed BMUs (on site); 3) Project is active during seasonal use by bears for an extended time period thus reducing the habitat capability to produce grizzlies and thereby contributing to reduced population potential; 4) Connecting corridors to adjacent habitat areas (other BAAs) are not maintained; 5) Bear/human encounters could still result in additional bear mortality; 6) Interagency Grizzly Bear Guidelines intent are not met ; 7) Connecting linkage to the Bitterroot ecosystem may be fragmented, due to additional housing needs for ASARCO employees.

Potential Measures for Removing, Avoiding, or Compensating for Adverse Effects

The analysis performed in conjunction with this Biological Assessment identified unmitigated adverse effects on the grizzly. Additional mitigation or compensation for adverse effects is required beyond that which is included in the proposed action (including the mitigation plan). Additional measures are: 1) to meet the intent of the Interagency Grizzly Bear Guidelines, the Mitigation Plan items need to be in place **prior to the start** of the ASARCO Rock Creek Mine.

## WATER HOWELLIA

### Description of Population and Habitat Status

Surveys for this species were conducted concurrent with the sensitive plant surveys (see biological evaluation of sensitive species). No occurrences of this species were found.

Water howellia grows in firm consolidated clay and organic sediments that occur in wetlands associated with ephemeral glacial pothole ponds and former river oxbows (Shelly and Moseley 1988). These wetland habitats are filled by spring rains and snowmelt runoff; and depending on temperature and precipitation, exhibit some drying during the growing season. This plants microhabitats include shallow water, and the edges of deep ponds that are partially surrounded by deciduous trees (Shelly and Moseley 1988; Gamon 1992; USFWS 1994). No suitable habitat exists in the planning area.

### Analysis of Direct, Indirect, and Cumulative Effects

No harvest or road building activities occur in suitable habitat. There would be no direct, indirect or cumulative effects to this species or its habitat.

### Statement of Findings

The proposed project would have no effect on water howellia or its habitat, based on 1) no activities in potentially suitable habitat, and 2) no plants present.

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## OTHERS CONSULTED

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PERKINSON, DOUG. Forest Fisheries Biologist. Supervisor's Office, Kootenai NF

SHELLEY, KEVIN. Consultation Biologist. U.S. Fish and Wildlife Service.

SUMMERFIELD, BOB. Forest Wildlife Biologist. Supervisor's Office, Kootenai NF

## Appendix A: TES Conservation Measures Implemented to Date on Kootenai National Forest (June 1992)

### Bald Eagle

Osprey/eagle nesting surveys done annually, 1980-present.
Monitoring of reported eagle sightings.
Participation in national mid-winter bald eagle surveys.
Funding of aerial survey for bald eagle nests in 1989.
Public education/school programs on TES species.

### Peregrine Falcon

Monitoring of reported sightings.
Funding of 1989 aerial survey to identify potential peregrine habitat.
Monitoring of historical nest site in the Yaak since 1979.
Public education/school programs on TES species.

### Wolf

Monitoring and evaluation of reported sightings and sign.
Funding Wolf Ecology Project to aerially monitor radio collared wolf.
Coordination with Idaho Department of Fish and Game, Montana Department of Fish, Wildlife, and Parks, and USFWS on wolf management and planning.
Management of habitats for ungulate prey base through road closures, prescribed habitat burning, forage seeding, timber sale coordination.
Public contacts and educational presentations to the local schools in Troy, Libby, Eureka, and Yaak areas.

### Grizzly Bear

#### Habitat Improvement (since 1975)

Approximately 900 acres of prescribed burning of grizzly bear habitat.
Approximately 2000 acres of big game habitat burning with secondary benefits to grizzly bears and wolves.
Approximately 225 acres of forage seeding for grizzly bears.
Approximately 1350 acres of forage seeding for big game with secondary benefits to grizzly bears and wolves.
Approximately 450 miles of roads closed year round or seasonally.
Approximately 2,826 acres replacement habitat proposed for Montanore

#### Habitat Inventory and Cumulative Effects Analysis (CEA)

Participated with Border Grizzly Project (BGP) in reconnaissance surveys of the Yaak to assess habitat and populations.

Conducted habitat component mapping.
Developed and implemented grizzly bear Cumulative Effects Analysis process, and calculate CEA annually since 1984 on all BMU's.

Studies

1986-87, Yaak black bear study with secondary information collected on grizzlies. Provided administrative support, facilities, and equipment.
1989-present, Yaak grizzly study. Provided funding, vehicles, housing, equipment, and administrative support.
1985-present, funded aerial bear occurrence/shrubfield survey.

Grizzly Relocations

1976-83, provided relocation sites for a total of 7 bears from other ecosystems. Participated in monitoring these bears, also provided housing and administrative support to BGP trackers.
1991-1994, 4 female grizzly brought from Canada and placed in Cabinet Mountain wilderness as part of population augmentation plan

Monitoring

Annually collect, record, and evaluate all grizzly reports since 1975.
Aerial surveys during late summer to document grizzly occurrence.

Resource coordination

Active participant in all interdisciplinary planning of activities within grizzly habitat; provide biological input at all levels and phases; develop Biological Evaluations for activities; initiate consultation with USFWS and MDFWP as needed.
In the process of adopting a MOU with MDFWP and USFWS to oversee
Montanore project grizzly bear mitigation plan.

Information/Education, Law Enforcement

Annual road patrols concentrated mostly during rifle hunting seasons.
Signing grizzly habitat with bear identification materials.
Participate with MDFWP and USFWS in investigating mortality instances, coordinating additional closures, and informing the public.
Established "Grizzly Bear Mortality Working Group" in conjunction with Interagency Grizzly Bear Committee in 1989.
Public education/school programs on TES species.
In the process of establishing I&E and Law enforcement positions as mitigation for Montanore project.

## Appendix B: Detailed Proposed Project Description

### Alternative IV – Modified Rock Creek Project with Mitigations

The major modification distinguishing this alternative from alternatives II and III is the location of the portals and mill site at the confluence of the East and West forks of Rock Creek, about 1.5 miles closer to the Clark Fork Valley than alternatives II and III. This decreases the utility corridor length but increases adit length and the amount of waste rock produced (see **Figure 2-24**). **Table 2-7** lists the significant issues pertinent to this project and indicates which of the following sections addresses mitigating measures for those issues. Chapter 4 contains a more detailed discussion of how the mitigating measures would reduce or eliminate environmental impacts.

Alternative IV includes applicable modifications, mitigations, and monitoring plans from Alternative III as summarized below:

***Modifications:***

- Alternate impoundment design at the Rock Creek location
- Alternate rail load-out location near Miller Gulch
- Alternate location for wilderness ventilation adit

**TABLE 2-7.**
Alternative IV Modifications and Mitigations

| | Categories | | | | | | |
|---|---|---|---|---|---|---|---|
| Significant Issues | Mine Plan | Water Use & Management | Transportation | Utilities | Employment | Reclamation | Monitoring & Mitigation Plans |
| Surface & Ground Water Quality | | x | x | x | | x | x |
| Fish, Wildlife, and T&E Species | x | x | x | x | x | x | x |
| Impoundment Stability | | | | | | | |
| Socioeconomics | x | | | | | | |
| Old Growth Ecosystem | x | | | | | | |
| Waters of the U.S. and Wetlands | x | | | | | | x |
| Public Access/Traffic Safety | | | x | | | | |
| Aesthetic Qualities | x | | | | | x | |

- Combined utility and road corridor
- Relocation and reconstruction of FDR No. 150

*Mitigations:*

- Subsidence control and monitoring plan
- Rock mechanics and hydrogeologic sampling, testing and monitoring program to include an acid-base testing program
- Visual and sound mitigations for the mill site and ventilation and exploration adits
- Panel review of alternate impoundment design including feasibility of seepage reduction methods
- Use of mine waste rock for starter dam construction
- Use of excavated clays to seal more permeable areas within impoundment footprint
- Development of a transportation management plan
- Visual mitigations for the utility corridor
- Revised grading and revegetation plans for the mill and impoundment sites to mitigate visual impacts
- Deeper soil salvage and replacement depths to facilitate revegetation
- More detailed long-term reclamation monitoring plan than Alternative II
- More detailed aquatics/fisheries, wildlife, threatened and endangered species monitoring and mitigation plans than under Alternative II, including a sediment source reduction plan outside the permit area
- A comprehensive, long-term water monitoring plan which includes monitoring lake levels at Cliff and Copper lakes to be coordinated with subsidence control and monitoring plan and fisheries/aquatics monitoring plans
- An alert level and contingency/corrective action plan for each monitoring plan
- Maintenance and possible long-term post-closure water treatment
- Revisions to ASARCO's Wetlands Mitigation Plan

### Mine Plan

The alternative mine/mill site, as shown on **figures 2-24 and 25,** would be located above the 10-foot flood stage (about 100-year flood event). It would be sited on cut-and-fill pads located at the toe of the southwest facing ridge at the confluence. The layout would afford a reasonably compact mill site arrangement. The relocation of the mine and mill site would reduce impacts to old growth habitat and wetlands in the West Fork of Rock Creek and would reduce sedimentation to surface waters.

The portal location would be placed at elevation 3,040 feet as shown in **Figure 2-24** and would be adjacent to the mill site. This location would place the portal 1,000 feet lower than the ASARCO proposal. Each of the adits would be about 6,500 feet longer than those proposed by ASARCO. This results in an approximate 67 percent increase in waste rock production, from 600,000 tons to 1 million tons. A tabulation of differences between the alternative mine/mill site and ASARCO's proposed location is provided in **Table 2-8.** The 1 million tons of waste rock would be used in part to construct the mill site pad, potentially raising the ground level at the mill site by a maximum of 50 feet. This maximum height would limit the mill site's visibility from Forest Service roads and wilderness viewpoints. Additional rock excavated from the adits beyond that needed to construct the pad would be used for foundation material and construction of starter dams at the impoundment. There would be no waste rock dump under this alternative.

**TABLE 2-8.**
**Comparison of Mill Site Alternatives**

| Facility | Alternative II | Alternative IV | Difference for Alternative IV |
|---|---|---|---|
| Adit Elevation | 4,100 ft. | 3,040 ft. | Adit portal about 1,000 ft. lower |
| Adit Length | 9,000 ft. | 15,500 ft. | Each adit is 6,500 ft. longer |
| Adit Grade | +12.7% | +12% | .7 % flatter |
| Waste Dump Tonnage | 600,000 tons | 1,000,000 tons | 400,000 tons increase |
| Waste Dump Area | 10 acres | included in mill site | 10-acre decrease[1] |
| Mill Site Area | 40 acres | 47 acres | 7-acre increase |
| Surface Conveyor Length | 2,400 ft. | included in mill site | 2,400 ft. decrease |
| Utility Corridor Length | 36,150 ft. | 29,000 ft. | 7,200 ft. decrease |
| Road Upgrade Length | 21.6 mi. | 19.1 mi. | 2.5 mi. decrease |

[1] Waste rock used for construction of mill site area.

ASARCO would retain a minimum 100-foot vegetative buffer between FDR No. 150 and mine/mill facilities for visual screening except at the constructed overpass bridge for FDR No. 150 and at the mine adit access road (see **Figure 2-25**). Mill site surface disturbances would not occur within 300 feet of either fork of Rock Creek to provide a fisheries buffer. These buffers would help reduce sediment loading to Rock Creek and impacts to sensitive fish species and other aquatic life.

### Surface Disturbance

A total of about 542 acres would be disturbed within the permit area under Alternative IV (see **Table 2-1**).

### Water Use and Management

Water use and management would be substantially the same as in alternatives II and III except that one unnamed intermittent stream would have to be routed through or around the mill site.

### Transportation

Due to the relocation of the mill site, the reconstruction of FDR No. 150 would be shortened by 2.5 miles. Mine and public traffic would share paved FDR No. 150 to the entrance of the mill site at which point ASARCO would reconstruct a 24-foot gravel road for a length of 1,900 feet to the intersections with the heavy equipment access road. The road would then taper to a single-lane and cross a newly constructed overpass of a gravel general access to the mine adit (see **figures 2-24 and 2-25**). Public and mine traffic conflicts would be reduced by routing most of the mine adit traffic under FDR No. 150 except for heavy equipment. The reduction in road length and subsequent construction/reconstruction activities would reduce the sources of new sediment loading to surface waters and lessens impacts to sensitive fish species and other aquatic life in the West Fork of Rock Creek.

### Utilities

The utility corridor would be shortened by about 7,200 feet due to relocation of the mill site. The shorter utility corridor would reduce construction-related sediment impacts. There would also be fewer opportunities for potential spills from ruptured pipes in the Rock Creek Drainage; no pipelines, except the temporary water discharge line from the exploration adit, would be located in the West Fork of Rock Creek.

### Employment

ASARCO submitted a revised employment schedule (Dave Young, ASARCO, Incorporated, personal communication, April 26, 1995) because the longer mine adits from the confluence mill site would increase the construction period. The revised schedule would limit the construction employment to about 350 workers for 1.5 years during years 4 and 5. Most mine development work (about 80 workers) would be done between exploration and mine construction. Employment would drop slightly during pre-production (approximately 180) before mine operation peaked at about 340 in year 7. This work force rescheduling would help reduce the boom/bust employment cycle.

### Reclamation

***Postmining Topography.*** ASARCO would develop a design, subject to the Agencies' approval, to reshape faces of the confluence mill pad to more closely resemble the surrounding landscape. This design would incorporate small drainages, convex and concave forms, and varying slope gradients within swales that would repeat the surrounding landscape in form and shape. Pad faces would be graded concurrent with construction and revegetated immediately following pad completion, allowing the pad to blend with the surrounding landscape more quickly and reducing sedimentation to surface waters and impacts to sensitive fish species. The pad surface would be regraded and revegetated following mine closure. The overpass bridge would be removed and trench of the underpass (of the general mine access road) refilled and regraded to approximate original contour. Interim revegetation around buildings and roads would stabilize the site during operations.

***Soil Salvaging and Handling Plan.*** Soil salvage depths would be similar to those in Alternative III. Soil volumes would be slightly different due to the deeper soils available at the confluence site and less road construction and reconstruction. Soil stockpile locations for the mill site are shown on **Figure 2-25**.

***Revegetation.*** ASARCO would develop a detailed final planting plan for the mill site. Final revegetation of pad faces would occur as soon as the pad was completed. It would be seeded with grasses and forbs and planted with containerized shrubs and trees. Plantings would mimic natural patterns of vegetation. All other aspects of the planting plans would be as described in Alternative III.

### Monitoring and Mitigation Plans

***Threatened and Endangered Species Mitigation Plan.*** Nearly all aspects of the Threatened and Endangered Species Mitigation Plan proposed for Alternative III would be the same. However, the relocation of the mill site and the shorter transportation corridor would reduce the impacted acres; ASARCO would have to acquire 2,303 replacement or conservation easement acres as part of the mitigation.

***Wetlands Mitigation Plan.*** Alternative IV would impact 6.0 acres of wetlands and 0.4 acres of Waters of the U.S. (see **Table 2-4**). Only 10.5 acres of wetlands mitigation sites proposed by ASARCO would still be available for use. Other locations within the riparian areas along Rock Creek and within the proposed permit area might have the necessary wetland hydrologic characteristics to replace the access road mitigation site acres. ASARCO might be required to identify additional mitigation sites to comply with its 404(b)(1) permit. Other components of the wetlands mitigation plan would be the same as for Alternative III.

## Appendix C: Record of Recent Informal Consultation with U.S. Fish and Wildlife Service

| | |
|---|---|
| Feb. 16, 1988 | U.S. Fish and Wildlife Service response to ASARCO scoping document. |
| Mar. 31, 1988 | Kootenai National Forest requests species list from U.S. Fish and Wildlife Service. |
| Apr. 21, 1988 | U.S. Fish and Wildlife Service provides Species list for ASARCO project area. |
| Dec. 15, 1988 | Meeting with Larry Lockard (USFWS) and Forest Service biologists to discuss mitigation and compensation for ASARCO Rock creek mine proposal. |
| Dec. 20, 1988 | USFWS letter to verify species list provided in April 21, 1988 letter. |
| Mar. 27, 1989 | Documentation of Phone conversation between Larry Lockard (USFWS) and Brian Kahn and Kiesling (Nature Conservancy) on the Nature Conservancy being a third party participant in grizzly bear recovery. |
| Mar. 27, 1989 | Documentation of Phone conversation between Larry Lockard (USFWS) and Chris Servheen (Grizzly Bear Coordinator - USFWS) on grizzly bear mortality as related to public education and the augmentation program. |
| Jun. 29, 1989 | USFWS letter to verify species list provided in April 21, 1988 letter and reconfirmed on Dec. 20, 1988. |
| Jan. 30, 1990 | USFWS letter to verify species list provided in April 21, 1988 letter and reconfirmed on Dec. 20, 1988 and June 29, 1989. |
| May 4, 1990 | USFWS response as an informal review of a draft biological assessment on the Montanore and Rock Creek mine projects. |
| Nov. 19, 1993 | Meeting with Kevin Shelly (USFWS), Lisa Fairman (OEA contract biologist), Paul Kaiser (KNF IDT Leader), Wayne Johnson (Cabinet District Biologist). Parties agree to a number of items regarding analysis of effects on grizzly bear. Also clarified USFWS position concerning ASARCO and Montanore project overlap. |
| Dec. 1, 1993 | District Ranger requests updated list of endangered, threatened, and proposed species in or near the planning area from the U.S. Fish and Wildlife Service. |
| Jan. 25, 1994 | U.S. Fish and Wildlife Service provides updated list of threatened, endangered, and proposed species that may be present in project area. |

| | |
|---|---|
| April 29, 1994 | Meeting between USFWS, MDFWP, KNF biologists to discuss 4-27-94 Draft Mitigation Plan of ASARCO. Team reviewed draft and accepted, modified or deleted items as appropriate. Draft Mitigation plan to be included in Draft BA. |
| July 22, 1994 | District Ranger requests updated list of endangered, threatened, and proposed species in or near the planning area from the U.S. Fish and Wildlife Service. |
| Aug. 24, 1994 | U.S. Fish and Wildlife Service provides updated list of threatened, endangered, and proposed species that may be present in project area. |
| Dec. 21, 1994 | Meeting with MDFWP and USFWS to review agency's draft ASARCO mitigation plan. Changes made to draft plan based on input from Harvey Nyberg (MDFWP), Kevin Shelly and Wayne Kasworm (USFWS). |
| May 18, 1995 | District Ranger requests updated list of endangered, threatened, and proposed species in or near the planning area from the U.S. Fish and Wildlife Service. |

## APPENDIX D

"Cumulative Effects Model" (CEM) Process

5-18-95

## T&E ANALYSIS PROCESSES AND ANALYSIS AREAS FOR ASARCO ROCK CREEK MINE

### INTRODUCTION

Data from aerial, vehicle, and foot surveys and sightings, radio telemetry, historical sightings, scat analysis, and vegetative mapping were used in the analysis. This provides information on populations and habitat. Literature reviews pertinent to the species and the proposed project supplemented detailed studies.

### BALD EAGLE AND PEREGRINE FALCON

The primary study area centers around the proposed permit area for peregrine falcon and bald eagles. Cumulative effects analysis area expands to cover the Clark Fork and Bull river corridors (1 mile either side of the river).

### GRAY WOLF

The primary study area centers around the proposed permit area. Cumulative effects analysis area expands to cover that portion of the Cabinet Ranger District that lies north and east of the Clark Fork River. This is based on the territory size, and the assumption that a pack territory could exist on each side of the Clark Fork River.

### GRIZZLY BEAR

A larger area was used for analysis of cumulative impacts to the grizzly bear. This area includes all of bear management units (BMU) 4, 5, and 6, which are areas which have been delineated for cumulative effects analysis. These bear units cover an area from the Idaho state line to west of Highway 2 south of Libby. The bear units have been in use for analyzing cumulative impacts to grizzlies since 1982. BMUs were used to determine percent habitat effectiveness, based on minimum level of 70 percent.

Sub-units of BMUs called bear analysis areas (BAA) were used to determine open road densities, based on a maximum level of 0.75 miles per square mile (640 acres).

The vegetative habitat analysis follows the cumulative effects model (CEM) as outlined in "Cumulative Effects Analysis Process for the Selkirk/Cabinet-Yaak Grizzly Bear Ecosystems" (IGBC 1988). Early and Late habitat units were mapped within the Rock creek drainage and values and acres displayed for all habitat units that were impacted (physically changed or within project influence zone of 1/4 to 1/2 mile).

Based on the CEM process (specifically Table 4 pg 12) replacement habitat needs were identified as follows (ALT. # 4):

Tailings site: (404 acres physically changed)

A disturbance coefficient (DC) of 0.0 is assigned. This means that total displacement occurs and none of the area would be available for bear use at any time during the project. A 100% compensation level assigned.
404 x 1 = 404 acres needed

Tailings site influence zone: (406 acres - includes only those acres not already disturbed by existing facilities (Road 150, railroad)

A DC of 0.1 is assigned. This means that the ability of the area to support bears is 10% of potential. A 90% compensation level assigned.
406 x .9 = 365.4 acres needed

Mill site and Facilities: (58 acres physically changed)

A DC of 0.0 is assigned. This means that total displacement occurs and none of the area would be available for bear use at any time during the project. A 100% compensation level assigned.
58 x 1 = 58 acres needed

Mill site influence zone: (278 acres - includes only those acres not already disturbed by existing facilities (Roads 150, 150A)

A DC of 0.1 is assigned. This means that the ability of the area to support bears is 10% of potential. A 90% compensation level assigned.
278 x .9 = 250.2 acres needed

Transportation Corridors: (70 acres - includes only those acres from new roads, pipelines, power lines)

A DC of 0.0 is assigned. This means that total displacement occurs and none of the area would be available for bear use at any time during the project. A 100% compensation level assigned.
70 x 1 = 70 acres needed

Transportation Corridor influence Zone: (1564 acres - only includes those acres not already disturbed by existing roads and/or additional acres due to an increase in activity level)

A DC of 0.3 is assigned. This means that the ability of the area to support bears is 30% of potential. A 70% compensation level is assigned.
1564 x .7 = 1094.8 acres needed

Exploration Adit & Facilities: (10 acres)

A DC of 0.0 is assigned. This means that total displacement occurs and none of the area would be available for bear use at any time during the project. A 100% compensation level assigned.
10 x 1 = 10 acres needed

Exploration Adit influence Zone: (72 acres - only includes those acres not already disturbed by existing roads and/or additional acres due to an increase in activity level)

A DC of 0.3 is assigned. This means that the ability of the area to support bears is 30% of potential. A 70% compensation level is assigned.
72 x .7 = 50.4 acres needed

**TOTAL REPLACEMENT HABITAT ACRES REQUIRED**: 2302.8 "IN KIND" ACRES

Rounded to: **2,303** acres

**"IN KIND" ACRES**

Acceptable "in kind" replacement acres include: 1) fee title, 2) conservation easement. Either method must be permanent.

APPENDIX E

**DRAFT** **DRAFT** **DRAFT** **DRAFT**
**DRAFT**

6-14-95

## THREATENED and ENDANGERED SPECIES MITIGATION PLAN
## for
## PROPOSED ASARCO ROCK CREEK MINE

This mitigation plan displays the specific items identified that are required to reduce, eliminate, or provide substitution for environmental consequences to species federally listed as threatened or endangered. It covers implementing Alternative Four as displayed in the Environmental Impact Statement for the ASARCO Rock Creek Mine project. From this plan a Final Mitigation Plan will be developed and implemented by ASARCO and appropriate state and federal agencies.

### TO REDUCE MORTALITY RISK TO THREATENED AND ENDANGERED SPECIES ASARCO WOULD:

1. Develop a transportation plan designed to minimize mine-related vehicular traffic, traveling between state highway 200 and the mill site, and minimizes parking availability at the plant site. Agencies approval required.

2. Not use salt when sanding during winter plowing operations, on Forest Development Road 150 (FDR-150), to reduce big game mortality that could draw bald eagles, wolves and grizzly (in spring) to the road corridor and increase mortality. ASARCO would monitor the number of road kills on FDR-150.

3. Daily remove road killed animals from road rights-of-way within the permit area and along roadways used for access or hauling ore (FDR 150, 150A and new road built for the project). Road kills would be moved at least 50 feet beyond the right-of-way clearing and further if necessary to be out of sight from the road.

4. Construct power lines following criteria outlined by Olendor, Miller and Lehman (1981) to reduce potential for electrocution of bald eagles.

5. Work with other mines operating in the area (ie. Noranda) to partially fund a public information and education program to aid in grizzly bear conservation. This would be the same program as required in the Record of Decision for the Montanore Project (9/93), not an additional one. The

program would be funded for 5 years and then evaluated for need to continue as is or modify to better benefit the grizzly.

6. Work with other mines operating in the area (ie. Noranda) to partially fund a local MDFWP law enforcement position for the life of the mine. This would be the same position as required in the Record of Decision for the Montanore Project (9/93), not an additional one.

7. Bear-proof all containers holding attractants and remove them in a timely manner.

8. Not use clover in the seed mix used on any disturbed area during active operations, to reduce grizzly/human encounters caused by bears being drawn to clover sites.

9. Prohibit employees from carrying firearms within the permit area, except for security officers and other designated personnel.

10. Prohibit employees from feeding bears.

**TO MAINTAIN HABITAT EFFECTIVENESS FOR THREATENED AND ENDANGERED SPECIES, ASARCO WOULD:**

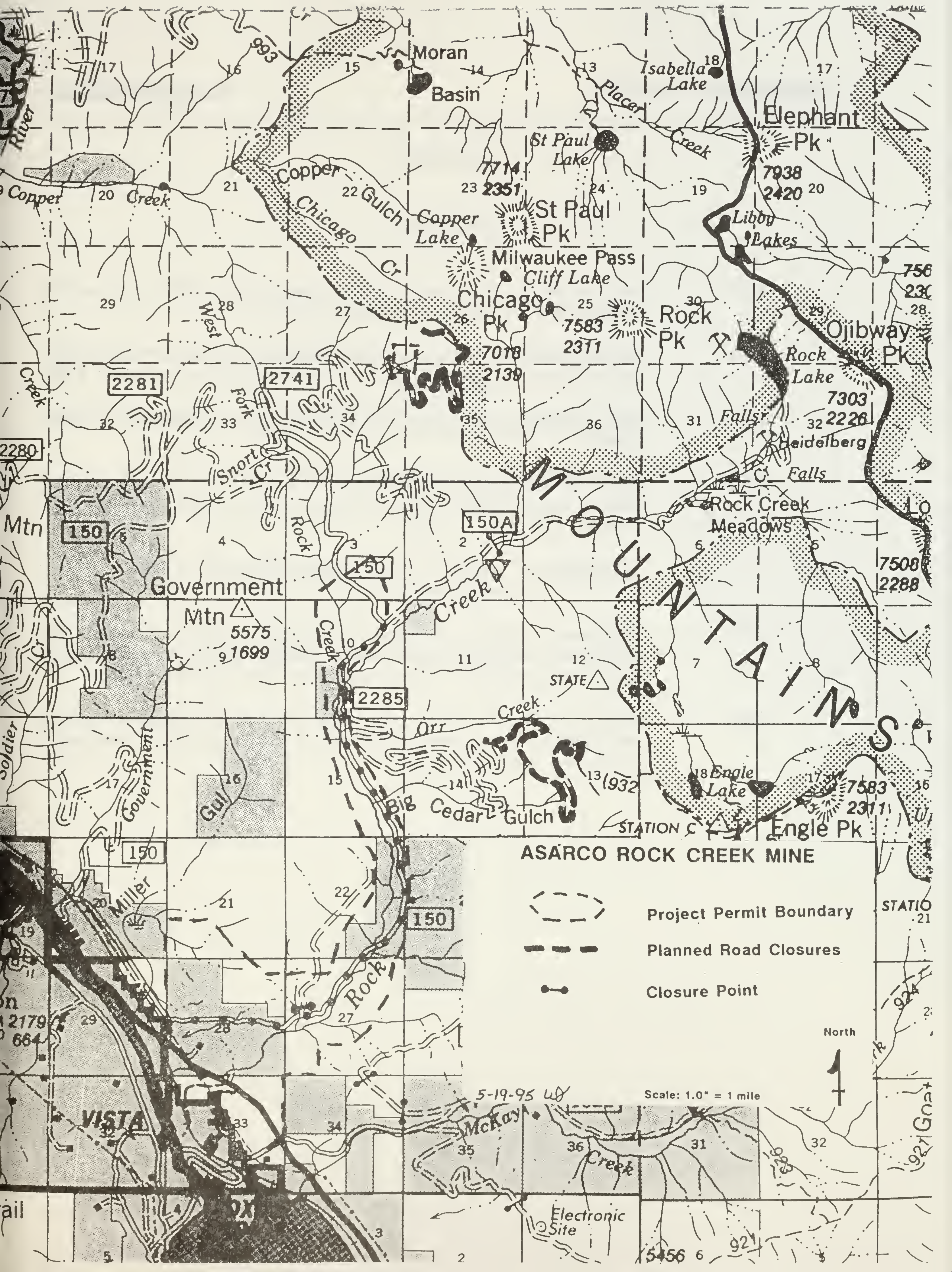
11. Prior to start of construction, secure or protect (through conservation easement -including road closures- or acquisition) replacement habitat to compensate for acres lost by physical alterations, or acres with reduced habitat effectiveness due to disturbance. Replacement acres for Alternative Four are: 2,303.

    Either fee title or conservation easements are acceptable. They must be permanent. Fee title lands would be turned over to the Forest Service. First choice for replacement habitat is within the disturbed BMUs. If adequate replacement acres are not available in those BMUs then acres may be found in other BMUs within the southern portion of the Cabinet Mountains.

**TO REDUCE MORTALITY RISK AND MAINTAIN HABITAT EFFECTIVENESS FOR THREATENED AND ENDANGERED SPECIES THE KOOTENAI NATIONAL FOREST WOULD:**

12. Close the following roads prior to the start of ASARCO construction activities:

| Road Number | Road Name | Aprox. Miles | Closure Period | Closure Method |
|---|---|---|---|---|
| 2285 | Orr Creek | 2.0 | Yearlong | Barrier |
| 2741 | Chicago Peak | 2.5 | Yearlong | Barrier |
| | | 4.5 | | |



ASARCO ROCK CREEK MINE

## APPENDIX F

## GLOSSARY

| | |
|---|---|
| BAA: | Bear Analysis Area: a sub-unit of a BMU used to analyze ORD. Also used to determine adequate "in kind" displacement habitat. |
| BMU: | Bear Management Unit: land area containing sufficient quantity and quality of all seasonal habitat components to support a female grizzly. Used to analyze %HE. |
| ORD: | Open road density: miles of open road per 640 acres in Management Situation 1 lands. |
| %HE: | Percent Habitat Effectiveness: Percent of the BMU area free from human disturbance (greater than 1/4 mile from open roads, or greater than 1 mile from helicopter flight path). Formula:<br>$\frac{\text{Total BMU Ac. - (MS3 Ac. + MS1 Influence Zone Ac)}}{\text{Total BMU Acres}} = \%\text{HE}$ |
| MS1 | Management Situation One: lands where grizzly habitat maintenance and improvement, and grizzly-human conflict minimization will receive the highest management priority (pg. 3 Interagency Grizzly Bear Guidelines, 1986). |
| MS3 | Management Situation Three: lands where grizzly bear presence and factors contributing to their presence will be actively discouraged (pg. 4 Interagency Grizzly Bear Guidelines, 1986). |

# APPENDIX C

## PRELIMINARY SECTION 404(b)(1) SHOWING

## ASARCO Incorporated - Rock Creek Mine Project

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## REVISED
## PRELIMINARY SECTION 404(b)(1) SHOWING
## DA Permit No.
## ASARCO Incorporated - Rock Creek Mine Project

*This document represents the opinions of the Kootenai National Forest (KNF) and Montana Department of State Lands (DSL), hereinafter referred to as the Agencies, as to how the preferred alternative (Alternative IV) complies with the requirements of the 404(b)(1) guidelines. This Showing is not intended to represent the Corps of Engineers' conclusions or their Final 404(b)(1) Evaluation. This Showing is provided to solicit public input, comments, and foster increased public awareness and participation in the Environmental Impact Statement (EIS) process.*

### 1.0 SUBPART A - GENERAL INTRODUCTION

The 404(b)(1) Guidelines (40 CFR 230) are the substantive criteria used in evaluating discharges of dredged or fill material in waters of the United States (Waters of the U.S.) under Section 404 of the Clean Water Act, and are applicable to all 404 permit decisions. Fundamental to these Guidelines is the precept that dredged or fill material should not be discharged into an aquatic ecosystem unless it can be demonstrated that such discharges would not have unacceptable, adverse impacts either individually or in combination with known or probable impacts of other activities affecting the ecosystems of concern.

Subpart B of the Guidelines outlines restrictions imposed on all discharges, the factual determinations required by the Guidelines and specifications for a determination of compliance or non-compliance with the Guidelines.

> Section 230.10(a) states no discharge of dredged or fill material shall be permitted, except as provided under Section 404(b)(2) of the Clean Water Act, if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.
>
> Section 203.10(b) establishes three conditions, applicable to inland waters, which must be satisfied to make a finding that a proposed discharge complies with the Guidelines. No discharge of dredged or fill material shall be permitted if it:
>
> a) Violates applicable state water quality standards;
>
> b) Violates any applicable toxic effluent standard or prohibition under Section 307 of the Clean Water Act; or
>
> c) Jeopardizes the continued existence of species listed as endangered or threatened under the Endangered Species Act of 1973, as amended, or results in likelihood of the destruction or adverse modification of a habitat which is determined to be a critical habitat.
>
> Section 230.10(c) provides that no discharge of dredged or fill material shall be permitted if it will cause or contribute to significant degradation of the Waters of the U.S., except as provided under Section 404(b)(2).

Section 230.10(d) prohibits the discharge of dredged or fill material, except as provided under Section 404(b)(2) of the Clean Water Act, unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Section 230.11 requires the permitting authority to determine in writing the potential short-term or long-term effect of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment in light of subparts C-F. The determinations of effects of each proposed discharge shall include the following:

a) Physical substrate determinations;

b) Water circulation, fluctuation, and salinity determinations;

c) Suspended particulate and turbidity determinations;

d) Contaminant determinations;

e) Aquatic ecosystem and organism determinations;

f) Proposed disposal site determinations;

g) Determination of cumulative effects on the aquatic ecosystem; and

h) Determination of secondary effects on the aquatic ecosystem.

Subparts C through F lists the effects of the potential impacts on the physical and chemical characteristics of the aquatic ecosystem; the potential impacts on the biological characteristics of the aquatic ecosystem; the potential impacts on special aquatic sites; and the potential effects on human use characteristics to be considered in making the factual determinations and the findings of compliance or non-compliance in Subpart B. Subpart G sets forth evaluation and testing procedures to provide information necessary to reach the determinations in Subpart B. Subpart H lists actions to be undertaken to minimize the adverse effects of discharges of dredged or fill material.

This section 404(b)(1) evaluation includes a description of the proposed discharge of fill material to be evaluated under Section 404 of the Clean Water Act and an analysis of the discharge pursuant to Subparts B through H. For the purposes of this evaluation, primary effect are equated with direct impacts and secondary effects are equated with indirect impacts. Construction-related impacts are considered direct. Indirect impacts can occur at some distance from the project site or can be associated with actions that occur after the project is operational.

Additionally, the Corps of Engineers Regulations 33 CFR 320.4a(2)i-iii require consideration as to the relative extent of the public and private need; where there are unresolved conflicts as to resource use; and the extent and permanence of the beneficial and/or detrimental effect which the proposed structure or work is likely to have on the public and private uses to which the area is suited.

## 1.1 Project description - ASARCO Rock Creek Mine Project

The ASARCO Mining Company (ASARCO) requests permission to place fill material in various Waters of the U.S. in conjunction with the ASARCO Rock Creek mine project. This mining project is an underground hard rock copper and silver mine with the associated above ground processing and waste storage facilities located under and adjacent to the Cabinet Mountain Wilderness Area in the vicinity of Noxon, Montana. ASARCO's Rock Creek Mine Project will have a design capacity of 10,000 tons per day and an anticipated 30-year life-of-mine. The project permit boundary encompasses 2,412 acres, of which approximately 514 acres will be disturbance, and 1,898 acres will remain undisturbed.

ASARCO prepared a wetlands and Waters of the U.S. inventory for the Rock Creek Mine (ASARCO, Incorporated 1993). Nation Wetland Inventory (NWI) maps have not been produced for the mine project area. The delineated inventory results are presented on 13 individual large-format map sheets attached to the Wetland Inventory and Mitigation Plan (ASARCO, Incorporated 1993). Due to the relatively small size of the delineated wetland areas compared to the large mine permit area, the delineated wetland areas are not visually readable on a standard-format map sheet. Mapping units and their approximate acreage for the inventoried project area include: (1) wetlands - 10 acres; (2) non-wetland Waters of the U.S. - 52 acres; (3) wetland complex - 2 acres; and (4) riparian areas - 84 acres. Within the wetland complex and riparian areas are areas which may meet the technical criteria for wetlands but were not mapped because no mining-related impacts were proposed.

The wetlands and Waters of the U.S. inventory included only the areas designated to be either directly or indirectly affected by the proposed mine operations. The Corps of Engineers conducted a site inspection on September 19-21, 1994 and determined that the inventory was an accurate depiction of the jurisdictional wetlands and Waters of the U.S. (U.S. Corps of Engineers, 1994).

Wetlands and Waters of the U.S. within the proposed mine project area were recognized as providing several important functions and values in their ecological role (ASARCO, Incorporated 1993). Wetland functions and values were assessed using best professional judgement based upon the best available literature information (Marble 1992). A formal, standard, semi-quantitative evaluation assessment methodology, such as the habitat evaluation procedure (HEP) or Wetland Evaluation Technique (WET), was not used.

The functions and values of the wetlands within the project area that were considered to be of low importance were ground water recharge, ground water discharge, flood-flow alteration, and recreation and uniqueness heritage. Wetlands functions considered to be of low to moderate importance were sediment and toxicant retention, shoreline and streambank stabilization, nutrient removal and transformation, and production export. Aquatic and wildlife diversity and abundance were considered to be of moderate to high importance because the wetlands and adjacent major streams and tributaries provide the type and quality of habitat to fulfill these two functions.

Although wetlands in the mine permit area do not sustain fish populations, the Waters of the U.S., including Rock Creek, East Fork Rock Creek, and West Fork Rock Creek, do support fish. Bull trout occur in all three streams and appears to be a permanent resident (ASARCO, Incorporated 1993).

Wetlands in the mine permit area provide habitat for wildlife, including amphibians, reptiles, mammals, and birds. Wetlands and adjacent Waters of the U.S. provide habitat, seasonal forage, and breeding and resting areas. No bird or mammal species, that is thought to be dependent on wetlands, was recorded in the wetlands study area (ASARCO, Incorporated 1993). Grizzly bear, which is listed as a threatened and endangered species, may also use the wetlands on a seasonal basis. With respect to wildlife, the impacted wetlands would constitute microsite habitats within a broader habitat component and thus, would not be critical to the wildlife's occurrence, distribution, or survival within the project area.

Approximately 5.5 of the total 6.0 impacted wetland acres are associated with the tailings impoundment (see Alternative IV; Table C-1). These wetlands are primarily located in broad shallow grassy swales in the ephemeral portions of the South Fork Miller Gulch drainage. The remaining 0.5 acres of impacted wetlands and the 0.4 acres of Waters of the U.S. will be lost due to the construction of the mill site and waste rock dump, and the powerline, pipelines, and access road crossings of the Rock Creek channel.

The wetlands associated with the proposed filled sites can be placed in three main types, or classes of wetland habitats, based on the hierarchical system described by Cowardin et al. (1979). The three classes of wetlands are the Upper Perennial Riverine, the Forested Palustrine, and Emergent Palustrine Wetland Systems. Wetlands located along the Rock Creek main channel and its tributaries have developed primarily on the low streamside terraces and would be classified as Upper Perennial Riverine and Forested Palustrine Wetland Systems. Localized wet areas downstream of isolated springs and seeps also occur and would be classified as Forested Palustrine Wetlands. These wetlands have developed primarily in poorly and very poorly drained glaciolacustrine sediments.

Wetlands along the West Fork Rock Creek channel and tributaries are also associated with low terraces (often discontinuous, narrow, streamside terraces) and localized wet areas associated with springs and seeps. These wetlands would be primarily classified as Forested Palustrine Wetlands.

Wetlands along the Miller Gulch intermittent drainages are associated with the gentle rolling topography and have formed in the natural surface depressions that concentrate surface water runoff from adjacent areas and cause ponding. The low permeability of the near surface lacustrine clays and silts and the low hydraulic gradients in the area have created saturated soils and shallow standing water. Many areas of these broad shallow grassy swales have characteristics which meet the wetland criteria and would be classified as Emergent Palustrine Wetlands.

Proposed mining and reclamation plans for the Rock Creek Project are detailed in Volume 2, Sections II and III, of the Hard Rock Operating Permit Application submitted to the Montana Department of State Lands (DSL), and the Kootenai National Forest (KNF). A wetlands and Waters of the U.S. mitigation plan, describing the construction of new wetlands and Waters of the U.S., is included in Section 3.0 of ASARCO's Wetlands Report (ASARCO, Incorporated 1993) and in Chapter 2 (pages 2-53 through 2-58) of this draft environmental impact statement (DEIS).

### 1.2 Description of filling activities associated with the ASARCO Rock Creek Mine Project

Construction and operation of the mine facilities will result in a direct impact through discharge of fill material to about 5.0 acres of wetlands and 0.4 acres of Waters of the U.S. (see Table C-2). An additional 1.1 acres of wetland will be indirectly affected by the project resulting in a total impact area of 6.0 acres of wetland and 0.4 acres of Waters of the U.S. Construction and operation of the tailings impoundment will account for about 5.5 of the total 6.0 acres of affected wetlands. The tailings impoundment will be constructed in the South Fork Miller Gulch drainage, and is described in the Revised Alternative Impoundment Design Report (Dames and Moore 1993) and discussed in Appendix D. The remaining 0.5 acres of wetland and 0.4 acres of Waters of the U.S. will be impacted along the Rock Creek channel by the construction of the mill site, waste rock dump, powerline, pipelines, and access road. Fifteen, large-formatted, detailed figures, are included in the Wetlands Inventory, Consideration of Alternatives, and Mitigation Plan (Wetlands Report) prepared by ASARCO with technical assistance from Western Technology and Engineering Inc. and Hydrometrics, Inc. (ASARCO, Incorporated 1993). These figures show the location and extent of the ASARCO Rock Creek project development and operational activities and their relationship to identified wetlands and Waters of the U.S.

The type and quantity of fill materials and the scheduled year for discharges are presented below in Table C-3. It is not possible to identify the specific quantities of fill placed in the wetlands and Waters of the U.S. for the sites containing large quantities of fill. Some of the fill quantities shown in Table C-3 are total amounts for the activity and not the specific quantities to wetland or Waters of the U.S. As much as 1.1 million yds$^3$ (1.3 million tons) of tailings may be directly placed on top of the approximate 4.5 acres of wetland located beneath the tailings impoundment. An estimated 800 yds$^3$ of on-site borrow material will be placed in wetlands during the upgrading of the main access road. The construction of the utilities corridor and excess mine water pipeline will impact wetland and Waters of the U.S. but will not require placement of fill.

Conventional earth-moving equipment, such as front-end loaders, dump trucks, bulldozers, and rubber-tired scrapers, will be used to place fill material in the wetlands and Waters of the U.S. for all sites except under the tailings impoundment. Wetland areas under the impoundment will be filled with mine tailings discharged from a tailings slurry pipeline.

## 2.0 SUBPART B - COMPLIANCE WITH THE GUIDELINES

### 2.1 Section 230.10 - Restrictions on the discharge

### 2.1.1 Section 230.10(a): Practicable alternative analysis

Four mining alternatives, described and analyzed in the DEIS, were developed in response to eight significant environmental issues identified during the scoping process and Agencies' discussions. The effects on wetlands and Waters of the U.S. was identified as one of the potential significant issues to drive the development of the alternatives and evaluation of impacts. The potential significant issues are discussed in detail on pages 2-1 through 2-4 in the DEIS. The affected acreage of wetlands and

Waters of the U.S. for each of the three action mining alternatives (Alternatives II, III, and IV) is shown in Table C-2.

Under Alternative I, the no-action alternative, the project would be denied which provides the baseline for estimating the effects of the other alternatives. All three action alternatives would fill wetlands and Waters of the U.S. The tailings impoundment would impact the same 5.5 acres of wetlands for all action alternatives. The location of the mill site, waste rock dumps (alternatives II and III only), powerline, pipelines, and access road upgrade will determine the total amount of wetlands and Waters of the U.S. impacted by the three action alternatives.

In addition to the four DEIS alternatives, a number of alternatives suggested during scoping were determined by the Agencies to be infeasible or otherwise unreasonable. The dismissed alternatives and their reasons for dismissal are discussed in detail in Chapter 2, Part III of the DEIS. The dismissed alternatives fall under the following eight topics:

- mill and mine portal siting alternatives;
- tailings impoundment siting and construction methods;
- McKay Creek impoundment alternative;
- McKay Creek water retention dam;
- other tailings disposal methods, including backfilling;
- rail siding locations;
- joint venture mineral development; and
- alternate water treatment methods.

The tailings impoundment siting and construction method was a critical alternative for evaluating impacts to wetlands because of the impoundment's size and location. A total of 21 potential tailings impoundment sites were identified and evaluated by the MAC Report (USFS 1986). Four potential tailings disposal sites were further evaluated; a summary of these tailings impoundment siting alternatives is presented in Table 2-10 of the DEIS and in Table C-4 of this 404(b)(1) Showing. Agency evaluations combined the impoundment siting and geotechnical components for the further evaluation. Considering the environmental and geotechnical factors, the Rock Creek tailings impoundment site was determined to be the practicable and least environmentally damaging tailings impoundment site. The Agencies considered and dismissed two other tailings disposal methods (dry tailings and backfilling of tailings into the mine) because the were either economically or environmentally impracticable. Specific reasons for their dismissal is presented in Chapter 2, Part III of the DEIS.

### 2.1.2 Section 230.10(b) - Discharge compliance with guidelines

The 404(b)(1) guidelines Section 230.10(b) require that no discharge shall be authorized if it:

1. Causes or contributes to any violation of applicable water quality standards.

2. Violates any applicable toxic effluent standard or prohibition under Section 307 of the Act.

3. Jeopardizes the continued existence of species listed as threatened or endangered under the Endangered Species Act (ESA) of 1973, as amended, or results in likelihood of the destruction or adverse modification of critical habitat under the ESA of 1973.

The discharge of tailings material at the impoundment site and the discharge of other fill materials proposed for construction and operation of the mine facilities have been evaluated under the following:

**State water quality standards:** The Montana Department of Health and Environmental Sciences (DHES), Water Quality Division provides Section 401 certification pursuant to the state rules (ARM 16.20.1701 et seq.). The Montana DHES will review this discharge of material and will make a determination for violations of applicable state water quality standards. Montana DHES will not make its final ruling until ASARCO submits a revised Water Management Plan for the Rock Creek Mine project and the Corps of Engineers completes their final 404(b)(1) evaluation. Section 404 permits, issued by the Corps of Engineers, require Section 401 certification. Any conditions to the 401 certification will be conditions of the Section 404 permit. A Section 401 certification does not constitute a relinquishment of Montana DHES Water Quality Division's authority, or any subsequent alterations or additions thereto, nor does if fulfill or waive any other local, state or federal regulations.

**Toxic effluent standard or prohibition:** Documentation of analysis of material to be discharged as a result of the project is contained in the DEIS. Determination of compliance with Section 307 of the Clean Water Act is encompassed in the Montana DHES review. Section 307 requires review of the project in light of the possible introduction of toxic pollutants. As indicated above, water quality certification pursuant to Section 401 of the Clean Water Act will be required. All conditions identified in the Section 401 certification will be included as conditions should the 404(b)(1) evaluation result in a recommendation to issue a permit.

**Threatened or endangered species:** Impacts to threatened or endangered species were addressed in the DEIS and are addressed elsewhere in this evaluation. To comply with the Endangered Species Act, the Forest Service will prepare a biological assessment to evaluate the potential effects on threatened and endangered species that may be present in the project area. The U.S.Fish and Wildlife Service (USFWS) will review the biological assessment and render a biological opinion. If the USFWS determines that the preferred alternative may jeopardize the continued existence of a species, it may offer a reasonable and prudent alternative that would, if implemented, preclude jeopardy. ASARCO must successfully meet the requirements of this section of the 404(b)(1) guidelines in order for the 404(b)(1) evaluation to result in a recommendation to issue a permit. The applicant realizes failure to meet the requirements of this section will result in a recommendation of denial.

### 2.1.3 Section 230.10(c) - Degradation of Waters of the U.S.

Project impacts which would cause or contribute to significant degradation of Waters of the U.S. are addressed throughout this document and in the DEIS. The recommendation to issue a permit will be based on the assessment of the project impacts and the proposed mitigation. In order to conclude that the Rock Creek Mine project will not cause or contribute to a significant degradation of Waters of the U.S, ASARCO must successfully met the requirements of this section of the 404(b)(1) guidelines.

Section 230.10(c) of the guidelines prohibits the discharge of dredge or fill material which will cause or contribute to significant degradation of Water of the U.S. Findings of significant degradation must be based on factual determinations, evaluations, and testing. 33 CFR Part 320.4(b)1-3 also states that the unnecessary alteration or destruction of wetlands should be discouraged as contrary to the public interest.

From a national perspective, the degradation or destruction of wetlands, and other special aquatic sites, is considered to be the most severe environmental impact covered by the 404(b)(1) guidelines. Wetlands perform various functions that are vital to the integrity of the wetland system and contribute to the overall quality of the nation's waters. Examples of these wetland functions are groundwater recharge and discharge, sediment stabilization, sediment/toxicant retention, and nutrient removal/transformation. Other wetland functions considered to be important to the public interest and which serve significant biological functions are the providing of: general habitat (nesting, spawning, rearing, and resting sites); aquatic diversity and abundance; wildlife diversity and abundance; recreation; and uniqueness in nature or scarcity in the region.

ASARCO completed the identification and delineation of wetlands and Waters of the U.S. for the Rock Creek project area with technical assistance from Western Technology and Engineering Inc. and Hydrometrics, Inc (Wetlands Inventory, ASARCO 1993). Only areas proposed for disturbance by the mining project were delineated. Delineation activities were conducted during 1991 and 1992 using both the 1987 wetlands manual (Environmental Laboratory 1987) and the 1989 Interagency manual (Federal Interagency Committee for Wetlands Delineation 1989). Most of the delineation work was conducted using the intermediate-level onsite determination method. Wetlands were mapped using topographic base maps and enlarged (1-inch equals 400-feet) color aerial photographs. The Corps of Engineers conducted a site inspection on September 19-21, 1994 and determined that the inventory was an accurate depiction of the jurisdictional wetlands and Waters of the U.S. (U.S. Corps of Engineers, 1994). Additional delineations will be conducted in 1995 to identify wetlands associated with Cliff and Copper lakes and the alternate locations of the lower portions of FDR No. 150 and the Miller Gulch rail load-out site.

Approximately 5.5 of the total 6.0 impacted wetland acres are associated with the tailings impoundment. These wetlands are primarily located in broad shallow grassy swales in the ephemeral portions of the South Fork Miller Gulch drainage. The wetland areas under the impoundment do not provide aquatic/fisheries habitat since they are generally isolated from the main stream channels. The remaining 0.6 acres of wetland will be lost along Rock Creek due to the construction of the mill site, waste rock dump, powerline, pipelines, and access road. These Rock Creek wetland sites may provide important aquatic habitat for fisheries; habitat for plant species of special concern (crested shield-fern, pointed broom sedge, black snake-root, and fringecup); and sensitive wildlife species habitat (such as the Harlequin duck and Coeur d'Alene Salamander). The applicant would perform a conservation assessment for crested shield-fern (a designated U.S. Forest Service sensitive plant species) with the results of the survey available prior to the Agencies' records of decision. Detailed information on aquatics/fisheries, plant species of special concern, and wildlife is included in chapters 3 and 4 of the DEIS.

The wetlands to be destroyed by the Rock Creek project can be placed in three main types, or classes of wetland habitats, based on the hierarchical system described by Cowardin et al. (1979). The three classes of wetlands are the Upper Perennial Riverine, the Forested Palustrine, and Emergent Palustrine Wetland systems. Wetlands located along the Rock Creek main channel and its tributaries have developed primarily on the low streamside terraces and are classified as Upper Perennial Riverine and Forested Palustrine wetland systems. These Rock Creek wetlands are considered to have low to moderate functional importance for sediment and toxicant retention, shoreline and streambank stabilization, nutrient removal and transformation, and production export. Aquatic and wildlife diversity and abundance are rated as moderate to high wetland functional importance because they are adjacent to Rock Creek and provide the type and quality of habitat to fulfill these two functions.

Localized wet areas downstream of isolated springs and seeps also occur along Rock Creek and are classified as Forested Palustrine wetlands. These springs and seeps may function to augment stream flows but most of the discharge to streams probably occurs during the wet seasons when it is least needed. These springs and seeps would provide the highest functional importance during periods of drought.

Emergent Palustrine wetlands have developed primarily in poorly and very poorly drained glaciolacustrine sediments along the ephemeral and intermittent drainages of Miller Gulch. These wetlands are associated with the gentle rolling topography and have formed in the natural surface depressions that concentrate surface water runoff from adjacent areas and cause ponding. Many areas of these broad shallow grassy swales have characteristics which meet the wetland criteria. The low permeability of the near surface lacustrine clays and silts and the low hydraulic gradients in the area have created saturated soils and shallow standing water. Even though these wetlands retain surface water for long periods of time, they likely have limited importance for ground water recharge because of the very low soil permeability. The Miller Gulch wetlands would have moderate functional importance for sediment retention, nutrient removal and transformation, and high functional importance for wildlife diversity and abundance. One important aspect of the Miller Gulch wetland sites for wildlife habitat is their larger size.

The cumulative impacts from all action alternatives for the Rock Creek Mine project, combined with impacts from the Montanore project and projected timber sales in the Rock Creek drainage, may decrease the amount of Waters of the U.S. and wetlands and their ecological functions. Aquatic and wildlife diversity and abundance are considered to be the two most important Waters of the U.S. and wetland functions. Development of the proposed tailings impoundment would remove more than 300 acres of natural watershed in the Miller Gulch drainage. The capture of surface water by the tailings impoundment and the surface and groundwater capture of the proposed tailings impoundment seepage collection system, would potentially reduce the frequency and duration of saturation, inundation, and ponding of water for some wetlands downgradient. In addition, a failure of the engineered seepage collection system to capture all seepage from the impoundment, may affect ground water quality and may impact additional downgradient wetlands. The failure of the tailings impoundment seepage collection system may result in a reduction in wetland functions, primarily from the loss of wildlife habitat diversity.

### 2.1.4 Section 230.10(d) - Appropriate and practicable steps to minimize potential adverse impacts of the discharges on the aquatic ecosystem

The primary steps to minimize potential adverse impacts to wetlands and Waters of the U.S. pertain to locating the mine facilities to maximize wetland avoidance. The major mine facilities which were located or modified to maximize wetland avoidance include:

(1) Main access road
(2) Utility corridors (powerline, pipelines)
(3) Mill site facilities and waste rock dump
(4) Tailings impoundment, topsoil stockpiles, and diversion ditches
(5) Borrow areas

In addition, several facility location alternatives were identified and include an alternative waste rock dump site, alternative mill facility locations, alternative tailings impoundment sites, and alternative access road locations. Other project-related alternatives were identified and considered to avoid or reduce impacts to wetlands and Waters of the U.S. They include (1) backfilling the underground mine with tailings, (2) backfilling the underground mine with waste rock, (3) underground milling, and (4) off-site milling.

Project impacts which would affect wetlands or Waters of the U.S. are addressed in the following text, in accordance with the 404(b)(1) guidelines. Appropriate and practicable steps have been developed to minimize potential adverse impacts on the wetlands and Waters of the U.S. In the event a 404 permit is approved and issued, these steps, including permit conditions and best management practices, will be incorporated into the 404 permit to ensure the project complies with this section of the guidelines. In addition, ASARCO has proposed wetland mitigation, to offset adverse impacts, which is describe in the following section.

## Wetland Mitigation Plan

ASARCO identified four possible wetland mitigation areas and one Waters of the U.S. mitigation site (see Figure 2-21 in the DEIS). The proposed acreages and mitigation schedules for the created wetlands and Waters of the U.S. are provided in Table C-5. The wetland mitigation sites are near the proposed filled wetlands and mitigation of the Waters of the U.S. will be to reconstruct the channel at the pre-mine location. Additional detailed descriptions, including site development, design specifications, and schedules, are presented in ASARCO's Wetland Mitigation Plan (ASARCO, Incorporated 1993) and Chapter 2 of the DEIS.

Under Alternative II, ASARCO proposes to disturb about 1.5 acres of Waters of the U.S., of which 1.1 acres would be within the mill facilities area by diverting and conveying flow from unnamed tributaries to West Fork Rock Creek. Following the end of mining and processing activities, all diversion ditches would be removed and the Waters of the U.S channel reclaimed to its approximate original configuration and function. The remaining 0.3 to 0.4 acres would be disturbed by pipeline stream crossings and bridge reconstruction. Alternative III would disturb the same areas as Alternative II, but Alternative IV would only impact 0.4 acres along the utility and road corridor. There area no mitigation areas for Waters of the U.S. under Alternative IV as the sites would only be temporarily disturbed during construction.

The borrow area 3 mitigation site would be developed into a wetland by excavating borrow material (using scrapers or a truck and shovel operation) to lower the surface elevation of the site to near that of the Rock Creek overflow channels. Excavation work would involve the construction of a series of channels with intervening ridges. Wetland hydrology for the borrow area 3 wetland would be established by excavating the channels to a depth which allows saturation and inundation of the area by seasonally high ground water. Soils on this site would be salvaged to a depth of about 13 inches and redistributed over the site to facilitate revegetation. If available, hydric soil from the wetlands to be impacted by the tailings impoundment could be salvaged and respread in the channels to increase the soil organic matter and provide a source of native plant material (soil seed bank and root sprigs). The channels would be seeded and planted with a shrub wetland mixture and the ridges with a forested/wetland mixture. Straw mulch would be spread onto the reseeded areas. The primary functions of the created borrow area 3 wetlands would be to reduce sediment transport to Rock Creek and increase habitat diversity for wildlife and aquatic species.

Under Alternative II, five small wetland sites would be created by the construction of a new segment of FDR No. 150. The access road wetland mitigation sites would occur where the new segment of road crosses small drainages resulting in temporary (seasonal) water retention on the uphill side of the road or along the borrow ditch. Establishing the wetland hydrology would rely on controlling water levels by raising culverts above the base of the fill or by using standpipes. Some existing wetlands have been artificially created by construction of the current Rock Creek road. Soil salvage details would be developed during the final design based on individual site soils. A clay sealant or polyvinyl chloride (PVC) liner would be considered if the hydraulic conductivity of the soil and substrate is too great. Following grading or sealant installation, salvaged soils would be respread and the sites seeded with a herbaceous wetland mixture and straw mulch applied. The primary wetland functions of the proposed access road created wetlands would be to reduce sediment transport to Rock Creek and increase habitat diversity for wildlife. These sites would not be available under alternatives III and IV due to relocation of the lower portions of FDR No. 150.

The Miller Gulch wetland mitigation sites for all alternatives would consist of a series of linear wetlands created along a side drainage to the main tributary of Miller Gulch. Establishment of wetland hydrology in the side drainage would rely on flow barriers designed to retain surface water runoff and increase the duration of saturation and inundation. The small retention dikes would be constructed at approximately 200-foot intervals and would be about 30 to 50 feet long and 5 feet high. Each dike would contain a rock-lined spillway. If the saturated hydraulic conductivity of the soil and substrate was too great, a clay sealant or PVC liner would be used. Hydric soils from the impacted wetland areas of Miller Gulch would be salvaged and directly respread on the mitigation sites to provide increased organic matter and a plant materials source. The sites would be broadcast seeded with a forested wetland mixture and trees and shrubs planted. Straw mulch would be applied. The primary wetland functions of the proposed Miller Gulch created wetlands would be to reduce sediment transport, increase aquatic and terrestrial habitat diversity and abundance, and attenuate peak flows.

The Rock Creek wetland mitigation sites would consist of four linear wetlands created adjacent to Rock Creek by excavating to a depth which would allow saturation or inundation of the areas by shallow ground water. Depth to ground water is generally less than 6 feet. Linear channels would be excavated with bottom widths varying from 10 to 25 feet to create a more natural configuration. Benches and shallow depressions would be constructed to increase water retention and create zones with variable saturation and inundation. Soil salvaged from the proposed Rock Creek wetland mitigation areas would be respread on all disturbed areas to facilitate revegetation. Linear channels would be seeded with a herbaceous wetland mixture and the sideslopes with a upland herbaceous mix. All sites would be mulched. Wetland functions of the proposed Rock Creek constructed wetlands would be to enhance ground water recharge and discharge and increase aquatic and wildlife habitat diversity and abundance.

## 2.2 Section 230.11 - Factual determinations

The potential adverse impacts of discharging fill and tailings material on the physical, chemical, and biological components of the wetland and aquatic ecosystem have been evaluated. Mitigation efforts to offset adverse impacts have been considered in this 404(b)(1) evaluation and in the DEIS. Determination of these impacts have included the following:

### 2.2.1 Section 230.11(a) Physical substrate determinations

The discharge of tailings from the Rock Creek Mine project will ultimately create a tailings impoundment facility that covers approximately 324 acres in the South Fork Miller Gulch drainage. Approximately 4.5 acres of wetland will be directly filled with tailings and an additional 1.0 acre of wetland downstream of the impoundment will be indirectly affected by the capture of surface water by the impoundment and the surface and ground water capture of the impoundment seepage collection system. An additional 0.6 acres of wetland will be destroyed along Rock Creek due to construction of the mill site, waste rock dump, powerline, pipelines, and access road.

Soils under the tailings impoundment area have developed in lacustrine materials (materials deposited in quiet waters) which occur on the higher terraces close to the confluence of Rock Creek and the Clark Fork River. These soils have ash-influenced surface horizons with high organic matter content. The soils along Rock Creek have developed predominantly in alluvial materials (deposited by moving water) and also have high organic matter contents in the upper ash-influenced surface horizons. Site specific soil information is presented in the DEIS.

The mineralogical and physical composition of the tailings impoundment materials will be variable and different than the lacustrine substrate. Characteristics of the waste rock material at ASARCO's Troy and Rock Creek projects are provided in Table 4-17 of the DEIS. Initial testing of the tailings material indicate a net neutralizing potential (see Table 4-13 in the DEIS). The tailings have a low sulfide content. The Agencies expect that the quality of the tailings slurry decant water to be similar to the ASARCO Troy tailings water. ASARCO Troy tailings water characteristics are presented in Tables 4-11 and 4-12 of the DEIS. The results of analyses performed to date suggest that exposure of Rock Creek ore and waste rock by mining would not generate acid mine water. Additional Acid Base Accounting (ABA) would be performed during the construction of the exploration adit to ensure the adit and excavated material were not acid generating.

The types of fill material placed in the 0.6 acres of wetland along Rock Creek will be mine waste rock, on-site borrow, topsoil, and subsoil. These fill materials may have similar mineralogical and physical characteristics as the substrate materials.

### 2.2.2 Section 230.11(b) Water circulation, fluctuation and salinity determinations

As described in this evaluation (See 4.4 Section 230.23) water circulation and fluctuation would be impacted by the capture of surface water by the impoundment and the surface and ground water capture of the impoundment seepage collection system. The discharge of fill materials along Rock Creek will be predominantly above the creek channel and will have limited impacts on circulation and fluctuations of Rock Creek water. Salinity levels are not expected to change.

### 2.2.3 Section 230.11(c) Suspended particulate/turbidity determinations

Discharges of fill materials and associated construction activities in the Rock Creek and Miller Gulch drainages would temporarily increase sediment contributions to wetlands and Waters of the U.S. Soil erosion and transport would occur primarily during filling (construction) activities and prior to vegetation establishment. Aquatic organisms would be impacted and a temporary decline in biological productivity can be expected. Inclusion of Montana DHES Section 401 permit conditions, as well as other conditions to control sedimentation and turbidity, will minimize these impacts. In addition, ASARCO's proposed best management practices will be implemented to control erosion and reduce sedimentation. Erosion control measures are described in detail throughout ASARCO's permit application. These measures involve mechanical practices, soil-handling techniques to enhance stability, hydrologic measures to control runoff and sedimentation, and revegetation practices to provide a stabilizing cover.

### 2.2.4 Section 230.11(d) Contaminant determinations

See Section 7.0 - EVALUATION AND TESTING (230.60 and 230.61).

### 2.2.5 Section 230.11(e) Aquatic ecosystem and organism determinations

The mining project would result in impacts to aquatic organisms due to the direct discharge of fill materials to 4.9 acres of wetland and 0.4 acres of Waters of the U.S., and the indirect impacts to another 1.1 acres of wetland. In addition, other activities, such as constructing the water treatment facility, logging the proposed disturbed areas, salvaging topsoil and subsoil, and construction the wetland mitigation sites would likely create sedimentation which would result in impacts. The physical, chemical, and biological integrity of Rock Creek would be modified particularly at the locations where the mine access road and mine utilities (powerline, pipelines) cross the Rock Creek channel. Adverse impacts would also occur to the 4.5 acres of wetland to be directly filled with tailings. If the Corps of Engineers permit evaluation concludes that a 404 permit should be issued, special conditions may be attached to the permit requiring monitoring and restoration if ASARCO's proposed best management practices are less than successful at erosion control.

Terrestrial wildlife species inhabiting areas near impacted stream segments and dependent on the aquatic ecosystem would be affected by the mining project. Species currently inhabiting the areas to be destroyed by filling activities, will compete for existence in surrounding areas containing similar habitat.

### 2.2.6 Section 230.11(f) Proposed disposal site determinations

As previously stated, the Montana DHES Water Quality Division provides Section 401 certification pursuant to Section 401 of the Clean Water Act. The Montana DHES has reviewed this discharge of material and will make a determination for violations of applicable state water quality standards. However, Montana DHES will not make its final ruling until ASARCO submits a revised Water Management Plan for the Rock Creek Mine project. No section 404 permits will be issued by the Corps of Engineers without the Section 401 water quality certification.

The proposed tailings impoundment would completely fill approximately 4.5 acres of wetlands. Criteria normally applied to mixing zone determinations is not applicable to these sites. The mixing zones at the locations where the mine access road and mine utilities (powerline, pipelines) cross the Rock Creek channel will be limited to the immediate areas of the discharge points. In addition, implementation of the best management practices will help reduce erosion and sedimentation, and limit the mixing zones to the immediate areas where the crossings occur on Rock Creek.

### 2.2.7 Section 230.11(g) Determination of cumulative impacts on the aquatic ecosystem

An analysis of cumulative impacts is contained for each resource area in Chapter 4 of the DEIS. Cumulative impacts are the collective impacts for the project when considered in conjunction with other past, present, and reasonably foreseeable activities. Cumulative impacts for the Rock Creek project include 730 acres of planned timber sales, potential land exchange, possible road closures, probable increase in recreation, and the Montanore project impacts.

The cumulative impacts from all action alternatives for the Rock Creek Mine project, combined with impacts from the Montanore project and projected timber sales in the Rock Creek drainage, may decrease the amount of Waters of the U.S. and wetlands and their ecological functions. Aquatic and wildlife diversity and abundance are considered to be the two most important Waters of the U.S. and wetland functions. Development of the proposed tailings impoundment would remove more than 300 acres of natural watershed in the Miller Gulch drainage. The capture of surface water by the tailings impoundment and the surface and groundwater capture of the proposed tailings impoundment seepage collection system, would potentially reducing the frequency and duration of saturation, inundation, and ponding of water for some wetlands downgradient. In addition, a failure of the engineered seepage collection system to capture all seepage from the impoundment, may affect ground water quality and may impact additional downgradient wetlands. The failure of the tailings impoundment seepage collection system may result in a reduction in wetland functions, primarily from the loss of wildlife habitat diversity.

### 2.2.8 Section 230.11(h) Determination of secondary effects on the aquatic ecosystem

A catastrophic failure of the tailings impoundment, considered a very low-probability event (see Geotechnical Engineering), would create an uncontrollable release to the environment. Should failure occur, sediment and tailings would fill Waters of the U.S. and wetlands and create adverse impacts to the aquatic ecosystem. Portions of the sediment mass would probably remain in stream channels for an undefined period of time.

Other secondary effects on the aquatic ecosystem from the Rock Creek project support activities may result from an increased surface runoff (and sedimentation) from cleared areas and the face of the tailings impoundment, reduced surface water flows from the capture of surface water by the impoundment and the surface and ground water capture of the impoundment seepage collection system, and elevated nitrate levels in mine water from the mine blasting.

### 2.3 Section 230.12 Findings of compliance or non-compliance with the restrictions on discharge

Based on the Agencies' preliminary assessment, data contained in the DEIS, the determinations of the preceding section, and the remainder of this evaluation, it appears that the discharge of fill material from the tailings impoundment construction and the road and utility crossings would comply with the requirements of these guidelines with the inclusion of appropriate and practicable implementation of Best Management Practices and the permit conditions to minimize any adverse effects of the discharge to the aquatic ecosystem.

## 3.0 SUBPART C - POTENTIAL IMPACTS ON THE PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM

Potential impacts of the discharge of fill from the Rock Creek project on the physical, chemical, and biological components of the aquatic environment have been evaluated. Mitigation efforts to offset adverse impacts and the mitigation ratios have not been finalized. Additional mitigation may be considered in the final evaluation upon review and approval of detailed engineering designs and drawings. Determination of these impacts include the following:

### 3.1 Section 230.20 Physical substrate determinations

As previously stated, the discharge of tailings will ultimately create a tailings impoundment facility that covers approximately 324 acres in the South Fork Miller Gulch drainage. Approximately 4.5 acres of wetland will be directly filled with tailings. An additional 0.4 acres of wetland will be destroyed along Rock Creek from the construction of the mill site, waste rock dump, powerline, pipelines, and access road. Surface soil materials from the tailings impoundment area will be salvaged and stockpiled prior to construction and filling activities. Stockpiled soil materials will be used primarily for reclaiming the impoundment site after mining. Hydric soils (wetland soils) will be salvaged from the 4.5 acres of delineated wetlands to be affected by the impoundment. The hydric soils will be directly respread on the Miller Gulch wetland mitigation sites to provide increased organic matter and a plant materials source. Soil salvage is not proposed for the other wetland areas (0.4 acres) due to their small size, inaccessibility to heavy equipment, and the additional adverse impacts which could result from the use of heavy construction equipment necessary to salvage the small amount of material available from these sites. Site specific soil information is presented in the DEIS.

### 3.2 Section 230.21 Suspended particulates/turbidity

An increase in the suspended particulates and turbidity in the Waters of the U.S. (Rock Creek channel) and water flowing through the delineated wetlands will occur during fill (construction) activities. Of primary concern for the lower portion of Rock Creek, is the potential impact of increased sedimentation on Bull trout spawning. The Bull trout spawns in depositional areas and increased sedimentation could have a significant impact on their reproduction rates. Erosion control measures are described in detail throughout the Rock Creek Mine permit application. These measures involve mechanical practices, soil-handling techniques to enhance stability, hydrologic measures to control runoff and sedimentation, and revegetation practices to provide a stabilizing cover. With the inclusion of these best management practices and the Forest Service and state soil and water conservation practices as well as reduction of existing sediment sources outside the permit area within the Rock Creek drainage, any project-related increase in the suspended particulates and turbidity in Rock Creek should not have a significant impact on the fishery.

### 3.3 Section 230.22 Water clarity, nutrients, environmental characteristics and values (chemistry)

The discharge of fill material for the project facilities will impact water characteristics. During fill (construction) activities, changes in the light penetration and water clarity could be reduced due to increases in suspended solids and nutrients. An increase in dissolved constituent concentrations, above background concentrations, could also occur. An increase in total nitrogen (nitrates, nitrites, and ammonia) from water discharge from the water treatment plant could lead to eutrophic or hypereutrophic conditions. Inclusion of Montana DHES Water Quality Division's Section 401 permit conditions, as well as other conditions, will minimize these impacts. In addition, ASARCO's proposed best management practices will be implemented to control erosion and reduce sedimentation.

### 3.4 Section 230.23 Current patterns and water circulation

The discharge of fill and construction of the powerline, pipelines, and access road crossings of the Rock Creek channel will modify water circulation and current patterns only at the points of discharge where the crossings of Rock Creek occur. The Rock Creek discharges will be predominantly above the creek channel and will have only minor impacts are expected. In addition, sound engineering and best management practices will help to minimize impacts.

Construction of the tailings impoundment will impact water patterns and circulation in the South Fork Miller Gulch drainage. Water patterns and circulation would be impacted by the capture of surface water by the tailings impoundment and the surface and ground water capture of the impoundment seepage collection system.

### 3.5 Section 230.24 Normal water fluctuations

The discharge of fill associated with the construction of the powerline, pipelines, and access road crossings of the Rock Creek channel will not impact normal water fluctuations because the discharges will be predominantly above the creek channel. The construction of the tailings impoundment will impact normal water fluctuations in the South Fork Miller Gulch drainage by reducing peak flows by the capture of surface water. The tailings impoundment and the surface and ground water capture of the impoundment seepage collection system may also decrease surface and ground water flows, especially during the growing season or dry periods. These decreases in surface and ground water flows may impact approximately 1 acre of wetland downgradient from the impoundment by allowing vegetative species more tolerant of drier sites to replace species requiring more moist site conditions.

### 3.6 Section 230.25 Salinity gradients

The Rock Creek Mine project is not expected to have any impact or effect on salinity gradients because the fill would be predominantly nonsaline materials and would be placed above the creek channel.

## 4.0 SUBPART D - POTENTIAL IMPACTS ON BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM

### 4.1 Section 230.30 Threatened and endangered species

A biological assessment (BA) of the on-site and off-site effects of the ASARCO Rock Creek mine project to threatened, endangered, and proposed wildlife species has been submitted to the USFWS (See DEIS, Appendix A). The BA concludes that the proposed mine project will have no effect on Water Howellia; is not likely to adversely affect gray wolf, bald eagle, and peregrine falcon; and may adversely affect the frizzly bear. Additional information on Threatened and Endangered species is presented in Sections 2, 3, and 4 of the DEIS. The USFWS will make recommendations to mitigate adverse effects that may include measures in addition to those discussed in the DEIS. The USFWS will issue a formal notification prior to the final EIS.

### 4.2 Section 230.31 Fish, crustaceans, mollusks, and other aquatic organisms in the aquatic food web

The Rock Creek drainage supports good diversity of invertebrates but relatively low total numbers. The most common types of macroinvertebrates are clean-water forms such as mayflies, stoneflies, and caddisflies. Four species of fish have been found in the Rock Creek drainage: westslope cutthroat trout, bull trout, brook trout, and rainbow trout. Cutthroat trout and bull trout are the dominant species. Additional information on fish and aquatic organisms is presented in Sections 2, 3, and 4 of the DEIS. The discharge of fill and tailings would affect aquatic organisms as a result of inundation, flow alterations and construction activities. Mitigating the loss of wetlands, along with implementing the best management practices and the Forest Service and state soil and water conservation practices, should minimize the impacts on fish and other aquatic organisms.

### 4.3. Section 230.32 Other wildlife

Terrestrial wildlife species inhabiting areas near impacted stream segments and dependent on the aquatic ecosystem would be affected by the project, especially during the construction period. However, surrounding habitat within the riparian areas would be capable of absorbing displaced individuals. Due to the relatively small area of aquatic habitat being adversely affected, relative to the total available habitat in the project area, the impacts are not considered to be significant.

## 5.0 SUBPART E - POTENTIAL IMPACTS ON SPECIAL AQUATIC SITES

As discussed previously, the project would result in impacts to wetlands and Waters of the U.S. habitats due to inundation, flow alterations, and construction activities. The physical, chemical, and biological integrity of the aquatic ecosystem would be modified as described in the DEIS and below.

### 5.1 Section 230.40 Sanctuaries and refuges

There are no sanctuaries or wildlife refuges in the project area which would be impacted by the project.

### 5.2 Section 230.41 Wetlands

Approximately 5.4 of the total 6.0 impacted wetland acres will be filled due to the construction of the tailings impoundment (see Alternative IV; Table C-2). The remaining 0.5 acres of impacted wetland and the 0.4 acres of Waters of the U.S. will be lost due to the construction of the mill site, and the powerline, pipelines, and access road crossings of the Rock Creek channel. Wetlands impacts are discussed in more detail in Section 4 of the DEIS and in the Wetland Mitigation Plan (ASARCO, Incorporated 1993).

ASARCO prepared the Wetland Mitigation Plan (ASARCO, Incorporated 1993) in compliance with Section 404(b)(1) of the Clean Water Act. The mitigation plan provides for the mitigation of and compensation for the unavoidable loss and potential diminishment of the wetland functions and values associated with development of the proposed project. ASARCO identified four possible wetland mitigation areas and one Waters of the U.S. mitigation site (see Figure 2-18 in the DEIS). However, only three wetland mitigation sites would be developed under Alternative IV. A brief description of the primary aspects of ASARCO's wetland mitigation plan is discussed in Chapter 2 of the DEIS. Detailed descriptions, including site development, design specifications, and schedules, are presented in ASARCO's Wetland Mitigation Plan (ASARCO, Incorporated 1993). A revised wetland mitigation plan will be submitted by ASARCO in 1995 to reflect changes made to ASARCO's 1993 plan for Alternative IV.

### 5.3 Section 230.42 Mud flats

There are currently no mud flats at the project site and the project will not create any.

### 5.4 Section 230.43 Vegetated shallows

Vegetated shallows are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation (palustrine emergent wetlands). Many areas of the South Fork Miller Gulch have characteristics which meet the wetland criteria and are classified as Emergent Palustrine wetlands. Wetlands impacts are discussed in more detail in Section 4 of the DEIS and in the revised mitigation plan.

### 5.5 Section 230.44 Coral reefs

There are no coral reefs associated with this project.

### 5.6 Section 230.45 Riffle and pool complexes

Riffle and pool complexes occur within the Rock Creek channel but should have minimal impacts from the mine project. The discharge of fill associated with the construction of the powerline, pipelines, and access road crossings of the Rock Creek channel will be predominantly above the main creek channel. The South Fork Miller Gulch drainage contains no riffle and pool complexes.

## 6.0 SUBPART F - POTENTIAL EFFECT ON HUMAN USE CHARACTERISTICS

### 6.1 Section 230.50 Municipal and private water supplies

The project will not have any effect or impact on municipal or private water supplies.

### 6.2 Section 230.51 Recreational and commercial fisheries

The project area does not support a commercial fishery. Although there is a fishery in Rock Creek, the stream does not appear to be highly utilized. Portions of Rock Creek, primarily along the section above the confluence of Engle Creek up to the East Fork and West Fork confluence, periodically dries up in the summer months. There are no fish in the portion of the South Fork Miller Gulch.

### 6.3 Section 230.52 Water related recreation

The project may have a minor impact on water-related recreational uses along Rock Creek. This impact may be offset by increased recreational uses created by the wetland mitigation sites. The project could also have an impact on sightseeing excursions in the project area. While the natural beauty of the Rock Creek drainage will be forever changed, revegetation and reforestation efforts will diminish the long term effect of this impact.

### 6.4 Section 230.53 Aesthetics

The project will impact the aesthetic serenity of the area, particularly during the initial construction phase. Some impacts will be long term, such as the landscape change caused by the tailings impoundment structure. The visual impacts of viewing the impoundment will depend on the time of year and the visual orientation of the viewer. Most other impacts will disappear after project completion with revegetation and restoration activities.

### 6.5 Section 230.54 Parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves

The project area is adjacent to and under the Cabinet Mountains Wilderness Area. All aboveground project facilities would be located outside the wilderness area, except for one ventilation adit. The primary impact to the wilderness area would be one of aesthetics for wilderness users viewing the surface facilities of the project.

Six historic sites were documented during the cultural resources investigations. All of these properties were determined to be ineligible for listing on the National Register of Historic Places by consensus of the KNF and Montana State Historic Preservation Office. No mitigation measures will be necessary prior to impacting these sites.

## 7.0 SUBPART G - EVALUATION AND TESTING

### 7.1 Section 230.60 General evaluation of dredged or fill material

The impoundment structure will be constructed using the sand portion of the tailings as its primary construction material. The impoundment area will be filled with fine tailings (slimes). Characteristics of ASARCO's Troy mine tailings solid and ASARCO's Rock Creek mine waste rock are presented in Tables 4-13 and 4-17 of the DEIS. Initial testing of the tailings material indicate a net neutralizing potential (see Table 4-13). The tailings also have a low sulfide content. The Agencies expect that the quality of the tailings slurry decant water to be similar to the ASARCO Troy tailings water. ASARCO Troy tailings water characteristics are presented in Tables 4-11 and 4-12 of the DEIS. The results of analyses performed to date suggest that exposure of Rock Creek ore and waste rock by mining would not generate acid mine water. Additional Acid Base Accounting (ABA) would be performed during the construction of the exploration adit to ensure the adit and excavated material were not acid generating. In addition, monitoring information would be evaluated and water treatment or other appropriate methods implemented, if necessary.

Fill material associated with the construction of the powerline, pipelines, and access road crossings of the Rock Creek channel will be natural borrow materials from nearby mine facility disturbances. The fill materials will be placed predominantly above the main Rock Creek channel. During the construction period, water clarity in Rock Creek could be reduced due to increases in suspended solids entrained in the water column from diffuse sources. The schedule for these fill activities is presented in Table C-3.

### 7.2 Section 230.61 Chemical, biological, and physical evaluation and testing

Characteristics of ASARCO's Troy mine tailings solid and ASARCO's Rock Creek mine waste rock are presented in Tables 4-13 and 4-17 in Section 4 of the DEIS. Initial testing of the tailings material indicate a net neutralizing potential (see Table 4-13). The tailings also have a low sulfide content. The Agencies expect that the quality of the tailings slurry decant water to be similar to the

ASARCO Troy tailings water. ASARCO Troy tailings water characteristics are presented in Tables 4-11 and 4-12 of the DEIS. The results of analyses performed to date suggest that exposure of Rock Creek ore and waste rock by mining would not generate acid mine water. Additional Acid Base Accounting (ABA) would be performed during the construction of the exploration adit to ensure the adit and excavated material were not acid generating.

Drilling and blasting activities would contribute to high concentrations of suspended particulates in the adit water and mine effluent. Suspended solids contribute nearly all of the total metals load to mine effluent and must be removed. Initial removal of suspended solids could be accomplished using settling sump or sand filtration and make be performed either above or underground. Treated water will retain some dissolved metals and most of the nitrogen compounds. Mine water quality is expected to be similar to the adit water quality from ASARCO's Troy mine (see Table 4-16, Section 4 of the DEIS). The potential for acid mine drainage exists, but is not anticipated based on available static testing data. The Troy mine may be the best predictive model available for the proposed project. No acid mine drainage has been noted at the Troy mine during its 13-year construction and operation. If the Corps of Engineers recommend issuing a permit, they may attach permit conditions requiring ASARCO to have a contingency operational plan in the event that acid drainage occurs.

## 8.0 SUBPART H - ACTIONS TO MINIMIZE ADVERSE EFFECTS

Project impacts which would affect wetlands or Waters of the U.S. are addressed in the following text, in accordance with the 404(b)(1) guidelines. Appropriate and practicable steps to minimize potential adverse impacts on the aquatic ecosystem have been developed and are addressed in the alternatives analyses in Section 4 of the DEIS. Waters of the U.S. and wetlands will be affected by the proposed project (see Table C-2). None of the alternatives would affect more than 1.5 acres of Waters of the U.S. Variable amounts of wetlands are affected but no more than 8.1 acres under any alternative.

ASARCO Rock Creek mining project will employ a number of best management construction methods to help prevent erosion and decrease sedimentation during construction activities. Methods may include using silt fencing wherever appropriate, diverting water flows around work areas, suppressing dust emissions during dry periods, and salvaging hydric soils from under the tailings impoundment for use in revegetation operations.

A preliminary wetland mitigation plan has been prepared (ASARCO, Incorporated 1993); a revised wetland mitigation plan is scheduled for completion in 1995. The wetland mitigation plan is also summarized in Chapter 2 of the DEIS and discussed in the various sections of this draft 404(b)(1) Showing.

### 8.1 Section 230.70 Actions concerning the location of the discharge

The Rock Creek proposed tailings impoundment location was chosen from several alternative locations for environmental as well as engineering reasons. In the Agencies opinion, the Rock Creek location appears to be the least environmentally damaging practicable alternative site for a tailings impoundment. The Rock Creek location will result in less destruction of wetlands and Waters of the U.S. than the McKay Creek impoundment site. The implementation of construction's best management practices will be employed to minimize soil erosion and sedimentation, and dust emissions during project activities.

The locations of the confluence mill site and the powerline, pipelines, and access road crossings of Rock Creek are being designed to avoid and minimize direct and indirect impacts to wetland and Waters of the U.S. Design and operational limitations are constrained by the mountainous topography, stream channel location, and the size of the mining related facilities. The proposed and alternate locations for these facilities are discussed in ASARCO's Wetland Report (ASARCO, Incorporated 1993).

An increase in the suspended particulates and turbidity in the Waters of the U.S. (Rock Creek channel) and water flowing through the delineated wetlands will occur during fill (construction) activities. Of primary concern for the lower portion of Rock Creek, is the potential impact of increased sedimentation on Bull trout spawning. The Bull trout spawns in depositional areas and increased sedimentation could have a significant impact on their reproduction rates. Erosion control measures are described in detail throughout the Rock Creek Mine permit application. These measures involve mechanical practices, soil-handling techniques to enhance stability, hydrologic measures to control runoff and sedimentation, and revegetation practices to provide a stabilizing cover. With the inclusion of these best management practices and the Forest Service and state soil and water conservation practices, any increase in the suspended particulates and turbidity in Rock Creek should not have a significant impact on the fishery.

### 8.2 Section 230.71 Actions concerning the material to be discharged

Very little can be done to change the physical nature of the tailings material to be discharged. Control of the slurry consistency will ensure optimum transport and settling, and will minimize the volume of slurry water which must be recaptured and recycled. Borrow materials used for the construction of the Rock Creek utility crossings will be similar to the natural alluvial materials in the vicinity.

### 8.3 Section 230.72 Actions controlling the material after discharge

The impoundment structure has been designed to fully contain all mine tailings. A tailings impoundment seepage collection system, consisting of underdrains, seepage collection trenches, ground water capture wells, and pump-back lines, will be constructed to minimize the potential contamination of ground water resources. The ground water capture wells would be located approximately 200 to 300 feet downgradient of the seepage collection ditches to minimize the potential for the capture wells to induce or accelerate seepage from the impoundment. Intercepted ground water would be returned to the impoundment.

Interim revegetation and stabilization would take place on all filled areas, along Rock Creek, that are associated with construction activities at the confluence mill site and the powerline, pipelines, and access road crossings of Rock Creek. The areas would be broadcast seeded, or hydroseeded, mulched, and fertilized.

### 8.4 Section 230.73 Actions affecting the method of dispersion

The wetland areas under the tailings impoundment would be completely covered by the proposed discharge. The tailings impoundment structure (dam) would contain the tailings slurry and not allow the dispersion or migration of tailings off site. The implementation of best management practices during the construction of the impoundment structure, seepage collection system components, and other project facilities will minimize the release and dispersion of any discharged materials off site.

### 8.5 Section 230.74 Actions related to technology

The implementation of best management techniques during construction to minimize any adverse environmental impacts would help to minimize adverse environmental impacts. Tailings slurry would be transported above ground via twin 10-inch, urethane-lines, high-pressure, steel pipelines to the impoundment for disposal. The lines would be encased in a larger steel pipe at the Rock Creek crossings to guard against spillage. Small emergency dump ponds would be excavated at the stream crossings, to contain potential spillage. Routine monitoring and inspection of the pipeline for leakage or breaks will be performed.

Hydric soils will be salvaged from the 4.5 acres of wetlands under the proposed impoundment and directly respread on the Miller Gulch wetland mitigation sites to provide increased organic matter and a plant materials source. Clay sealants or polyvinyl chloride (PVC) liners may be used to reduce deep percolation of water at the wetland mitigation sites.

### 8.6 Section 230.75 Actions affecting plant and animal populations

All plant populations in the tailings impoundment area will be lost, while animal populations will be displaced or lost as a result of construction activities. Reclamation activities will, upon completion, replace some of the lost habitat and provide space for the reestablishment of some of the lost plant and animal populations. In addition, in the event a 404 permit is approved and issued, permit conditions and additional mitigation measures may be incorporated into the 404 permit to ensure the project complies with Section 230.10(d) of the guidelines. ASARCO has proposed wetland mitigation to offset adverse impacts and provide reasonable mitigation for the loss of wildlife habitat.

### 8.7 Section 230.76 Actions affecting human use

The Rock Creek tailings impoundment site was selected because it appears to be the least damaging to the aquatic ecosystem of the tailings disposal alternatives. While the project will have a permanent negative effect on the aesthetics of the area, reclamation activities upon project completion and the planting of visual screening, will minimize the overall visual impact. The completed project is not expected to increase human activities in the area which are incompatible with current use patterns. The discharge is not expected to have any effect or impact on any public water supply intake.

Acid mine drainage is not expected to occur as a result of the tailings impoundment. This opinion is based on 13 years of tailings impoundment water quality data from the Troy mine, and initial net neutralizing potential testing (acid-base potential) of the Rock Creek waste rock and tailings (see Tables 4-13 and 4-17 of the DEIS). Following mining operations, ASARCO would monitor water quality in the vicinity of the tailings impoundment. If the Corps of Engineers recommend issuing a permit, they may attach permit conditions requiring ASARCO to have a contingency operational plan in the event that acid drainage occurs.

### 8.8 Section 230.77 Other actions

The design of the final impoundment surface, implementation of best management practices during construction and operations, and planned reclamation activities will minimize or eliminate any adverse environmental impacts which could be expected from future runoff or other discharges from activities to be conducted on the fill. The mitigation measures incorporated into this project are expected to offset any adverse environmental impacts caused by the discharge of fill material into Rock Creek, South Fork Miller Gulch, and the adjacent wetlands.

## 9.0 PRELIMINARY CONCLUSIONS

The proposed ASARCO Rock Creek mining project has been reviewed relative to the Section 404(b)(1) Guidelines and the Agencies have concluded the mining project will result in impacts to circulation and fluctuation patterns, substrate, suspended particulates/turbidity, water quality, and aquatic ecosystem structure and function. Several of these impacts will be permanent and long-term while others will occur primarily during the construction period and will be short-term. Cumulative effects from other mining activities, timber harvesting, and other forest related activities will be evaluated and considered prior to making the final permitting decision.

In the Corps of Engineers review of the project, all the alternatives considered in the Final EIS will be reviewed and evaluated to determine if there is a least damaging practicable alternative that could be permitted. Public interest factors, input from other state and federal agencies, and the proposed mitigation measures will also be considered by the Corps of Engineers in the evaluation process prior to their making a final permitting determination.

At the earliest, a final 404 permit evaluation cannot be made by the Corps of Engineers until 30 days after the Final EIS is published. However, based on the size and complexity of this project, the required detailed evaluation, and the preparation of required supporting documentation, the Corps of Engineers Final 404 permit evaluation will most likely not be completed until several months after the Final EIS is published.

## TABLE C-1
## Affected Acreage of Wetlands and Waters of the U.S. by Mining Alternatives

| | Affected Acreage (Direct + Indirect) | | |
|---|---|---|---|
| **Mining Alternative** | **Wetlands** | **Waters of the U.S.** | **Total Acres** |
| Alternative I - No Action | 0.0 | 0.0 | 0.0 |
| Alternative II - ASARCO Proposed Project | 8.1 | 1.5 | 9.6 |
| Alternative III - Proposed Project with modifications and mitigations | 6.2 | 1.5 | 7.7 |
| Alternative IV - Modified Rock Creek Project with mitigations | 6.0 | 0.4 | 6.4 |

## TABLE C-2
## Acreage of Wetlands and Waters of the U.S. Affected by the Proposed and Alternative Mine Facilities

| ALTERNATIVE IMPACTS | Wetlands (acres) | | Waters of the U.S. (acres) | |
|---|---|---|---|---|
| | Direct | Indirect | Direct | Indirect |
| **ALTERNATIVE II** | | | | |
| ASARCO mill site area | 0.[illegible] | 0.0 | 1.1 | 0.0 |
| ASARCO mill site waste rock dump | 0.6 | 1.3 | 0.0 | 0.0 |
| Access road upgrade (FDR No. 150) | <0.1[a] | 1.0 | <0.1 | 0.0 |
| Utilities corridor (powerline/pipelines) | 0.2 | 0.0 | 0.[illegible] | 0.0 |
| Rock Creek tailings impoundment | 4.4 | 1.0 | 0.0 | 0.0 |
| Topsoil stockpiles and diversion ditches | <0.1 | 0.0 | 0.0 | 0.0 |
| Excess mine water pipeline | <0.1 | 1.0 | 0.0 | 0.0 |
| **Alternative II Totals** | **[illegible]** | 1.3 | 1.5 | 0.0 |
| **ALTERNATIVE III** | | | | |
| ASARCO mill site area | 0.[illegible] | 0.0 | 1.1 | 0.0 |
| Alternative mine waste rock dump | 0.0 | 0.0 | 0.0 | 0.0 |
| Access road upgrade (FDR No. 150) | <0.1 | 0.0 | <0.1 | 0.0 |
| Utilities corridor (powerline/pipelines) | 0.2 | 0.0 | 0.3 | 0.0 |
| Rock Creek tailings impoundment | 4.4 | 1.0 | 0.0 | 0.0 |
| Topsoil stockpiles and diversion ditches | <0.1 | 0.0 | 0.0 | 0.0 |
| Excess mine water pipeline | <0.1 | 0.0 | 0.0 | 0.0 |
| **Alternative III Totals** | **5.2** | **1.0** | **1.5** | **0.0** |
| **ALTERNATIVE IV** | | | | |
| Confluence Mill Site and Waste Rock Dump | <0.1 | 0.0 | 0.0 | 0.0 |
| Access road upgrade (FDR No. 150) | <0.1 | 0.0 | <0.1 | 0.0 |
| Utilities corridor (powerline/pipelines) | 0.2 | 0.0 | 0.3 | 0.0 |
| Rock Creek tailings impoundment | 4.4 | 1.0 | 0.0 | 0.0 |
| Topsoil stockpiles and diversion ditches | <0.1 | 0.0 | 0.0 | 0.0 |
| Excess mine water pipeline | <0.1 | 0.0 | 0.0 | 0.0 |
| **Alternative IV Totals** | **5.0** | **1.0** | **0.4** | **0.0** |

[a] <0.1 acres rounded up to 0.1 acres for acreage totals

## TABLE C-3
## Fill Material Sites, Amounts, Types, Times, and Duration for the ASARCO Rock Creek Mine

| Fill Site | Fill Amount (Cubic Yards) | Type of Fill | Time and Duration (Project Year) |
|---|---|---|---|
| Utilities corridor | 0 | | |
| Excess mine water pipeline | 0 | | |
| Access road upgrade | 800 | On-site borrow | 1 |
| Mill site, patio, facilities, and roads (Proposed project) | 300,000[1] | Waste rock and on-site borrow | 2 - 5 |
| Topsoil stockpile and diversion ditches | 430,000[1] | Topsoil and subsoil | 1 |
| Waste rock dump (Proposed project) | 444,500[1] | Mine waste rock | 2 - 5 |
| Tailings impoundment | 82,304,500[1]<br>735,000[1] | Tailings<br>Waste rock and on-site borrow | 4 - 30<br>1 |

Note:

[1] It was not possible to identify the specific amount of fill to wetlands and Waters of the U.S. for these sites containing large quantities of fill. Fill amounts are total amounts for that activity, and not the amounts specific to the wetlands and Waters of the U.S. portions of the sites.

## TABLE C-4.
## Tailings Impoundment Siting Alternative Summary

| Site | Construction Option | Reason Dismissed from Further Consideration | Reference |
|---|---|---|---|
| Rock Creek (MAC Report Site 12) | Not Applicable | Insufficient capacity | MAC Report (USFS 1986) |
| Rock Creek (MAC Report Site 11A, ASARCO proposed site) | Downstream Method | Excessive amount of borrow required (40 million cubic yards). | Thompson 1989 |
| Noxon Bench (MAC Report Site 10) | Upstream Method | Tailings & reclaim water pipelines crossing the Clark Fork River. | Thompson 1989 |
| Noxon Bench (MAC Report Site 10) | Downstream Method | Tailings & reclaim water pipelines crossing the Clark Fork River. Excessive amount of borrow required (35 million cubic yards). | Thompson 1989 |
| Swamp Creek (MAC Report Site 21) | Upstream Method | Tailings & reclaim water pipelines twice as long as needed for the Rock Creek site. Disturbance area 200 acres larger than for the Rock Creek site. Site is privately owned and would require removal of residences. No distinct advantages over the Rock Creek Site. | Thompson 1989 |
| Swamp Creek (MAC Report Site 21) | Downstream Method | Same as upstream. Excessive amount of borrow required (10 million cubic yards). | Thompson 1989 |
| Swamp Creek/Rock Creek Combined Site | Downstream Method | Same as for Swamp Creek. Total disturbance area of approximately 700 acres . | Thompson 1989 |
| Noxon Bench/Rock Creek | Downstream Method | Same as for Noxon Bench. Total disturbance area of approximately 700 acres. | Thompson 1989 |
| McKay Creek | Downstream Method | Greater impact to Waters of U.S. and wetlands and diversion of a perennial stream. | Thompson 1989 |

**TABLE C-5**
**Proposed Acreage and Schedule for Created Wetlands and Reconstructed Waters of the U.S.**

| WETLAND MITIGATION SITES | CREATED ACREAGE | | SCHEDULE |
|---|---|---|---|
| | WETLANDS | WATERS OF THE U.S. | PROJECT YEAR |
| ASARCO mill site area | | 1.5 | 30 |
| Borrow area 3 | 7.5 | | 4 - 5 |
| Access road sites | 1.8 | | 1 |
| Miller Gulch sites | 1.2 | | 1 - 2 |
| Rock Creek sites | 1.8 | | 1 |
| **TOTAL WETLAND MITIGATION** | **12.3** | **1.5** | **1 - 30** |

## APPENDIX D - PUBLIC COMMENTS AND CONCERNS

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## INTRODUCTION

In order to identify public comments and concerns about the proposed project, the Montana Department of State Lands and U.S. Forest Service (Agencies) held public meetings on dates shown on **Table D-1**. On August 19, 1987, the Agencies participated in another meeting at which public concerns were aired. This meeting was held in Noxon, Montana and sponsored by the Clark Fork Coalition, a citizen organization.

**TABLE D-1.**
**List of Public Participation Meetings**

| | |
|---|---|
| May 26, 1987 | Public information meeting held on ASARCO's application in Noxon, Montana. |
| January 27, 1988 | Public scoping meeting on ASARCO's application at Noxon, Montana. |
| March 22, 1990 | Public meeting on ASARCO's petition to amend ambient water quality at Noxon, Montana. |
| June 16, 1993 | Public scoping meeting in Noxon, Montana. |
| June 28, 1993 | Public scoping meeting in Sandpoint, Idaho. |

In addition, the Agencies prepared a scoping document (Dec. 1987) requesting written comments from the public. Written comments were received from several agencies and from the public regarding the proposed project. All concerns were considered by the Agencies. Beneath each question, an answer is provided, or the EIS section that addresses the question is indicated. Some questions are outside the scope of the EIS. These questions are indicated as such, and no response is given.

## GEOLOGY

1. *What is the potential for subsidence and surface depressions occurring? Specifically, could Cliff and Copper lakes be adversely affected by the proposed mine? What is the emergency plan in case of subsidence?*

Response: The potential for subsidence due to mining and the potential for impacts to Cliff and Copper lakes are discussed in Chapter 4, Geology, Hydrology, Waters of the U.S. and Wetlands, and Aquatics Fisheries. Subsidence impacts are considered to be irreversible. No emergency plan to mitigate subsidence impacts has been proposed. Under alternatives III and IV, ASARCO would be required to submit final underground mine plans to the Agencies for review and approval as well as updated mine plans prior to mining in areas potentially susceptible to subsidence. The Corps of Engineers (COE) has indicated that a contingency plan to mitigate impacted wetlands to the Cabinet Mountains Wilderness would need to be part of ASARCO's 404(b)(1) permit applications. This would, in turn, address impacts for wilderness lakes.

2. *What is the fault/fracture system in the mine area?*

Response: See Chapter 3, Geology.

3. *Will the seismic study be extended to take into account the active Rainy Creek Fault and Bull River Fault and their relation to the Hope Fault?*

Response: No. See chapters 3 and 4, Geology.

4. *Will the possibility of catastrophic liquefaction of the tailings impoundment in the event of seismic activity be given serious consideration?*

Response: Catastrophic liquefaction potential of the tailings embankment and impoundment foundation is one of the primary considerations in the geotechnical design and analysis for the impoundment. For further discussion see Chapter 4, Geotechnical Engineering.

5. *Given the extreme difficulty in verifying design assumptions for material parameters in an upstream tailings dam, the 0.05g design acceleration is too low. Even the Agencies' suggestions of 0.01 and 0.15g are too low considering the inadequate seismic studies and undocumented material parameters. Will the Agencies consider requiring a minimum of 0.2g?*

Response: Based on existing seismic information, the Agencies consider the 0.16g design peak ground acceleration to be adequate.

6. *What is the possibility of collapse of the mine?*

Response: The Agencies' analysis of surface impacts from mining-induced fracturing assumes that the mine openings would eventually close. Chapter 4, Geology, discusses the potential for this to have an effect on the surface.

## HYDROLOGY

1. *Is the Rock Creek water baseline data sufficient to analyze the potential effects of the project on Rock Creek and other water sources near the mine?*

Response: Baseline water resources investigations in the Rock Creek area began in the fall of 1984. Surface and ground water study plans were reviewed and approved by an interagency task force including representatives of the Montana Department of State Lands (DSL), Department of Health and Environmental Sciences (DHES), and the Forest Service. Baseline data are considered sufficient to analyze impacts of the proposed project on water resources.

2. *Is there total suspended solids (TSS) information on Rock Creek? Will TSS be monitored?*

Response: Total Suspended Solids (TSS) data periodically have been collected from West Fork Rock Creek, East Fork Rock Creek, Rock Creek, and Miller Gulch. In addition, an automatic sediment sampler was installed at West Fork Rock Creek station WRC-2 in May, 1985. The sampler was programmed to collect a composite daily sample made up of 4 samples collected at 6-hour intervals. TSS in Rock Creek was generally less than 1 milligram/liter (mg/l) except during peak runoff, when TSS increased to about 8 mg/l. The surface water monitoring plan submitted by ASARCO includes sampling for TSS.

3. *Could the private well between the proposed tailings pond and the Clark Fork River be used to gather baseline data and be used as a monitoring station?*

Response: Baseline, operational, and postoperational water quality data can be collected from private wells. A number of private wells have been sampled as part of the ongoing baseline water quality investigation. Final operational and postoperational monitoring plans would be reviewed and approved by the Agencies.

4. *What is the potential effect of the project on water quality in the Clark Fork River and/or Lake Pend Oreille?*

Response: See Chapter 4, Hydrology and Aquatics/Fisheries.

5. *What is the current water quality of Copper Lake and Cliff Lake? How would the mine potentially affect the lakes?*

Response: Existing water quality data for Cliff and Copper lakes are presented in Chapter 3, Hydrology. The proposed mining operation is not expected to affect water quality in Cliff and Copper lakes. See also the response to Geology question 1.

6. *Is there sufficient baseline data to develop a water quality monitoring program? Would baseline studies be used as comparable data for the monitoring program before construction begins?*

Response: See the response to Hydrology question 1. Baseline data, where applicable, would be used to compare premining, operational, and postmining water quality conditions.

7. *Has a useful, comprehensive and specific biological, chemical, and sediment water monitoring plan been agreed upon and implemented?*

Response: Baseline water quality data have been collected since 1984. The Agencies consider these data to be useful, comprehensive, and specific. ASARCO has submitted an operational water quality monitoring plan to DSL which has been reviewed and revised. The revised monitoring plan is included as **Appendix H**.

8. *Who would do the monitoring? How frequently?*

Response: Monitoring is expected to be conducted by ASARCO or ASARCO's consultants, with periodic oversight from regulatory agencies. ASARCO has proposed that surface water quality samples be collected once during summer low flow, once during fall low flow, once during winter low flow, and once during the spring high flow period. Ground water quality data would be collected on a semiannual or annual basis. An annual report would be prepared and submitted to DSL for Agency review.

9. *Would the water monitoring program include an instream biological monitoring program as well as a water quality program?*

Response: An instream biological monitoring plan would be developed by ASARCO and approved by the Agencies (see **Appendix H**).

10. *How will the Agencies and ASARCO define degradation in terms of biological sediment and chemical degradation for water sources in the vicinity of the mine, especially Rock Creek?*

Response: Degradation of water quality is defined by the Administrative Rules of Montana (ARM 16.20.701-713).

11. *Could DSL be required to set up a better water monitoring system than is used on Lake Creek?*

Response: DSL, in conjunction with DHES, is responsible for approving monitoring programs and evaluating data for both the ASARCO Troy Mine and the proposed ASARCO Rock Creek Mine. ASARCO's final water resources monitoring plan will be reviewed by the Agencies. The Agencies' conceptual monitoring plan is provided in **Appendix H**.

12. *Would monitoring detect such substances as grease, oil, unknown chemicals, and blasting materials in Copper Gulch and the Rock Creek drainage?*

Response: ASARCO's proposed monitoring plan would analyze water samples for physical parameters, TSS, common ions, nutrients, and metals. The final surface water monitoring plan should consider analysis for both oil and grease. The water quality monitoring plan adopted for the proposed Rock Creek Mine is subject to final approval by the Agencies.

13. *Would adit construction be monitored? How and by whom?*

Response: Construction phase of the project would be inspected by state and federal officials to ensure that best management practices are used.

14. *How would ground and surface water be monitored after mine closure? By whom, and how frequently?*

Response: Please see response to question 11.

15. *How would seepage from the tailings impoundment be monitored? By whom?*

Response: The Agencies' conceptual monitoring plan proposes that ASARCO would monitor ground water quality downgradient from the proposed tailings impoundment. The period of time that ground water would be monitored after reclamation would depend on the quality of ground water documented during the 30-year mine life, and the ability to meet existing standards after reclamation.

16. *How would seepage affect ground and surface water?*

Response: See Chapter 4, Hydrology.

17. *Would seepage contain contaminants from the abandoned landfill under the proposed impoundment? How would impacts be mitigated?*

Response: The low permeabilities of the clayey materials near the abandoned Noxon sanitary landfill (estimated by ASARCO to be $7.2 \times 10^{-8}$ to $9.9 \times 10^{-4}$ cm/sec) are expected to impede the movement of ground water. Exploration backhoe trenches excavated into the landfill in September, 1985 encountered about 2 feet of standing water. Samples of trench water had higher concentrations of sodium, potassium, chloride, and nitrogen than concentrations obtained from baseline monitoring wells. No hazardous wastes or chemicals have been identified in the landfill area, which was permitted by DHES as a Group II (domestic waste) site. Ground water monitoring downgradient of the impoundment and landfill sites would be required to comply with Montana's Water Quality Act. Potential impacts would be mitigated by a downgradient extraction-well system to contain seepage.

18. *Would the tailings impoundment be considered a point source discharge?*

Response: ARM 16.20.902, which addresses the Montana Pollutant Discharge Elimination System (MPDES) Permit, defines "point source" as "...any discernible, confined or discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well...from which pollutants are or may be discharged." Based on this definition, any seepage from the base of the impoundment to the local ground water system would not be considered a point source discharge. Emergency or other types of releases from holding ponds, the impoundment, or the mine adit would be point source discharges. ARM 16.20.1001, which addresses the Montana Groundwater Pollution Control System, defines "source" as "any sewage system, treatment works, point source, disposal system, concentration of pollutants, or pond containing process wastes or pollutants...which under normal operating conditions may reasonably be expected to result in the discharge of pollutants to ground waters of the state." Therefore, seepage from the proposed Rock Creek impoundment would be considered to be a "source," and not a "point-source."

19. *If the tailings pond were a secondary water source and this water were not needed, what effect would this have on projected seepage from the tailings dam?*

Response: In its simplest form, the principal rule of ground water flow (Darcy's Law) states that ground water flow is equal to the permeability of the porous media, multiplied by the hydraulic gradient, multiplied by the cross-sectional area perpendicular to the direction of flow ($Q=KIA$). As such, flow through the base of the impoundment would be proportional to the depth of standing water in the impoundment. Therefore, if make up water needs decrease and the depth of water in the impoundment increases, the rate of seepage would also increase.

20. *What is the effect of the clay layer under the tailings?*

Response: From a hydrologic standpoint, a clay layer characterized by low permeability would slow the downward flow of seepage to the local ground water system. Clay foundations, however, present a number of geotechnical/engineering issues that must be adequately addressed in the design of a stable tailings impoundment.

21. *How would fissures and fractures in the bedrock under the tailings pond affect seepage?*

Response: The process of fracturing in bedrock increases the rock's secondary porosity (void spaces that are capable of storing water). Bedrock with continuous fracturing would most likely have a higher permeability than similar rock with discontinuous fracturing. An increase in permeability would also increase the flow of ground water or seepage. This situation would be most prevalent during the early stages of impoundment construction. Through time, fractures would fill with low-permeability materials and would transmit less water. See Chapter 4, Geology and Hydrology.

22. *What percentage of the tailings pond water would be recycled?*

Response: The percentage of tailings pond water that would be recycled is variable and depends on a number of factors including, but not limited to, precipitation (rain and snow), evaporation, and seepage from the base of the impoundment. Operation of the proposed Rock Creek mill would require 3,048 gallons per minute (gpm) of water. About 1,065 gpm would be made up from overflow from the thickener. If available, additional makeup water would be pumped from the tailings impoundment. If water from the tailings impoundment were unavailable, makeup water would come from the mine, or be pumped to the mill water reservoir from an alluvial well located adjacent to the Clark Fork River.

23. *How often would embankment and impoundment inspection be given? By whom?*

Response: The details of the Construction Quality Assurance Plan are to be worked out during the final design process. Field inspections most likely would be performed by an independent third-party engineering firm. The frequency of inspection and/or field testing would be dependent on the specific construction task being performed that day. At a minimum, inspection, testing and reporting to the Agencies would be consistent with the current standard of care common to the industry.

24. *If the mine continued past 30 years and a new tailings impoundment were necessary, what are the required state and federal permits and the environmental process?*

Response: ASARCO would have to apply to the regulatory agencies for an amendment to its operating permit and plan of operations in order to build a new tailings impoundment, if an additional site were determined necessary. The application would have to meet state and federal mining law requirements, including the Montana and National environmental policy acts (MEPA and NEPA).

25. *Who is responsible if, after mine closure, reclamation, and bond release, the tailings impoundment leaks or breaches?*

Response: ASARCO would be accountable for unacceptable environmental damages caused by failure of the reclaimed tailings impoundment, although final determination would be made by the state or federal courts.

26. *How would the tailings pipeline be engineered to prevent ruptures? Is there a detailed emergency plan in case of rupture?*

Response: The tailings slurry pipeline would be constructed of 10-inch, urethane-lined steel, high pressure pipe installed on piers. This pipeline would be encased in a larger pipe at creek crossings to guard against spillage. Small emergency dump stations would be constructed at critical points along the pipeline. Tailings slurry lines would be monitored visually for leakage. They also would be monitored continuously by mill operations personnel with pressure gauges and related instruments. ASARCO has prepared a sample Spill Contingency Plan. After final design was complete, and prior to operation, ASARCO would develop a detailed, site-specific emergency response plan for a tailings pipeline spill.

27. *What contingency plans have been developed to contain and clean up spills?*

Response: See response to question 26.

28. *How can ASARCO reasonably assure impoundment stability?*

Response: ASARCO can reasonably assure impoundment stability by prudent engineering design; standard construction monitoring and quality assurance procedures during construction of the starter dams and other facilities built prior to tailings placement; adherence to proper operational procedures during tailings placement; monitoring of pertinent material properties, pore pressures, and tailings placement geometry; periodic facility review by an outside engineering firm; and compliance reporting as required by the regulatory agencies. These are further discussed in Chapter 4, Geotechnical Engineering, and Appendix E.

29. *What are the anticipated long-term effects from the presence of the tailings impoundment?*

Response: The proposed tailings impoundment would create a modified landform that wouldn't fit into the natural surroundings, and would have a vegetative cover less diverse and productive than adjacent lands. See Chapter 4, Geology and Scenic Resources, for a more detailed discussion.

30. *What would the chemical composition of the tailings be throughout the life of the mine and for an extended period after project completion? What could filter out in a worst case event, such as an earthquake? How would hazardous material be stored?*

Response: Chemical characteristics of the tailings slurry from the Rock Creek Mine are expected to be similar to tailings produced at the ASARCO Troy Mine because of similarities in the ore bodies and milling processes. Selected characteristics of tailings solids and liquid for the ASARCO Troy project are provided in Chapter 4, Geotechnical Engineering, Hydrology, and Aquatics/Fisheries.

Milling reagents would be stored at the mill facility in clean, dry areas away from heat and sources of ignition in conformance with applicable laws and regulations.

31. *Would construction of the toe dam (the pond area below the dam that holds seepage) be monitored? By whom? How would the monitoring program work?*

Response: No toe dams are proposed. Seepage collection ditches would be used. All construction would be monitored using standard construction inspection and quality assurance methods. The direct construction monitoring would be done by representatives of ASARCO overseeing the performance and specification compliance by the selected contractors. The construction monitoring group, usually in conjunction with the design engineers, would prepare a construction report describing the construction of the tailings facilities. This report would be forwarded to the Agencies as required by the mine operating permit (see Chapter 2, Alternative II).

32. *Would the impoundment be subject to collapse if sufficient water were sprinkled to keep tailings from blowing?*

Response: Sprinkling would not increase the risk of embankment collapse. Only a small amount of water is necessary to prevent dust and should not influence the seepage regime within the embankment.

33. *What is the potential for the development of a leachate from the waste rock dump? How would effects be mitigated?*

Response: Rock Creek waste rock has a net acid-base potential of +84, indicating it is not an acid generator. The acid-base potential is a laboratory method to determine the acid-generating potential of sulfur minerals in a soil sample. This method balances the maximum acid-generating potential against the total neutralizing potential. The net acid-base potential represents the excess (or deficiency) of exchangeable bases, alkaline carbonates, or weatherable silicates and dolomites, and is generally expressed in tons of calcium carbonate ($CaCO_3$) equivalent per 1,000 tons of soil. Soil with a positive acid-base potential usually will not generate acid drainage since it contains sufficient neutralizing capacity to buffer any acid generated. Because of the waste rock's positive acid-base potential, along with the fact that recharge to the waste rock dump is minimal, it is reasonable to conclude that the potential for development of leachate is minimal. However, additional geotechnical testing of waste rock during exploration adit construction would be required for alternatives III and IV to confirm this. If acid generation is predicted, then waste rock dumps would be capped with clay prior to reclamation (see Chapter 4, Hydrology).

34. *Would there be a waste rock water monitoring plan?*

Response: See response to question 33. ASARCO has proposed a surface water monitoring plan for Rock Creek. Data collected during operation of the proposed project could be evaluated to identify surface water quality problems associated with the mine and waste rock water.

35. *How would ASARCO deal with snowmelt that is contaminated by particulates and acidified gases emanating from the mine?*

Response: There is no expectation for such a scenario to develop.

36. *What sources of ground water and surface water would be used for mine needs? What would be the impacts of this water use? If ground water were used, what would be the impacts of drawdown?*

Response: See Chapter 4, Hydrology.

37. *Would the mine's water requirements reduce the availability and quality of spring and well water used for domestic and irrigation purposes by adjacent landowners?*

Response: See Chapter 4, Hydrology.

38. *Would springs and wells located on private property in the vicinity of the project be monitored before, during, and after the project?*

Response: An inventory of wells and springs near ASARCO's proposed plant site, tailings impoundment, tailings pipeline, and ore body was conducted in 1985. The inventory identified 24 springs having flows greater than 1 gpm and six private wells. Data indicate the springs have very good water quality that meet criteria for protection of drinking water. Water quality samples have been collected from private wells. ASARCO has submitted an operational water quality monitoring plan for Agency approval. This plan has been reviewed by the Agencies. Based on this review, ASARCO's plan would require modifications would include monitoring after operations ceased (see **Appendix H**).

39. *What steps would be taken if springs and wells became contaminated? What would be done to provide water to people relying on those springs and wells?*

Response: See Chapter 4, Hydrology. In addition, the Metal Mine Reclamation Act requires DSL to investigate all damage to beneficial uses either in quantity or quality, and requires the company to replace the damaged supply with water of equal quantity and quality.

40. *What are the rights of residents if private water supplies were adversely affected?*

Response: Article IX of the Montana Constitution requires the legislature to provide for the administration, control, and regulation of water rights. The Montana Department of Natural Resources and Conservation (DNRC) administers water rights. If an appropriator of ground or surface water believes his/her use of water has been adversely affected, he/she may file a written complaint with DNRC describing the adverse effects. Personnel from the DNRC Water Rights Field Office would then conduct a field investigation. If this investigation indicated that existing water uses had been affected, a "show cause" hearing would be scheduled by DNRC, and a DNRC hearing examiner could make a decision to revoke or modify the water right permit responsible for the adverse effect. Further recourse would also be available to the affected water right holder by filing a civil action in Montana District Court.

41. *Tailings from the proposed mine would be situated directly on a drainage area that feeds the Miller Gulch aquifer. Since this area is critical for collecting precipitation and recharging local wells, springs, and streams, several current water rights holders would be affected.*

*It appears that one of two things could happen if the tailings impoundment is built:*

*1) The installation would work as outlined in the design study. In this scenario, water that normally would flow into the Miller Gulch aquifer would be captured in the impoundment, preventing current water rights holders from using 972 acre-feet of water per year, or 50 percent of their watershed. Since the drainage is slated for permanent damming at the end of the project, the water supply eventually would be lost.*

*2) The tailings impoundment installation would not work. In this case, the aquifer would be flooded with 2.3 cfs to 4.6 cfs of contaminated slurry water potentially carrying metals, nutrients, bacteria, reagents, and acids.*

*Will the Agencies consider an alternative tailings disposal system that would not infringe on current water rights holders? What means do these people have of protecting their water rights?*

Response: ASARCO's plan for reclamation of the proposed tailings impoundment includes diversion of precipitation and runoff from the impoundment surface, and rerouting the runoff in ditches to Miller Gulch. Therefore, the decrease in recharge to the aquifer would be temporary. For additional information, please refer to Chapter 4, Hydrology.

In addition, the Agencies considered an alternative tailings disposal system, namely, backfilling. This is discussed in Chapter 2, Alternatives Dismissed From Further Study; and **Appendix E.**

Issues pertaining to water supply and water quality are addressed in detail in Chapter 4, Hydrology. Water quality monitoring is addressed in **Appendix H**. In addition, the legal steps necessary for ASARCO to obtain a variance (thus allowing them to degrade water to a limited extent) are outlined below, including public input requirements.

Steps Necessary for ASARCO to Obtain a Variance, Obtain Public Input, and Monitor Water Quality

1. ASARCO must apply to the Board of Health (through DHES) for a variance to nondegradation, otherwise development would be precluded.

2. The probability is very high that the board would grant ASARCO a variance. The variance would specify upper limit concentrations for all water quality parameters. Upper limit concentrations could not be exceeded.

3. Upper limits would most likely be set at the Maximum Contaminant Level (MCL) or Maximum Contaminant Level Goal (MCLG) for those parameters that have

MCL/MCLGs established. If no MCL/MCLG exists, then the upper limit value would become a negotiable issue.

4. Negotiations would take place between ASARCO and the Water Quality Board (WQB), and could include direct input from the general public.

5. Once the variance was issued, ASARCO would be able to degrade ground water quality (and surface water quality), as long as levels remained below the upper limit values contained in the variance. Existing water users would have no recourse or grounds to file an objection, assuming maximum levels were not exceeded.

6. Water quality would be monitored. If WQB determined there was a violation of the limits set forth in the variance, then WQB would take appropriate action to rectify the situation.

7. It is assumed that once a violation took place, ASARCO's remedial action plan would be implemented.

Contact: Montana Department of Health and Environmental Sciences,
Water Quality Bureau
Cogswell Building
Helena, MT 59620
(406) 444-2406

Water rights issues are discussed in the responses to Hydrology questions 39 and 40. In addition, the following outlines legal procedures for protesting a water use permit application.

Steps to Apply for or Protest a Water Use Permit Application

1. Applicant completes a water use permit application using DNRC Form 600.

2. DNRC publishes public notice in local newspaper and contacts appropriators with existing water rights in same basin.

3. Existing appropriators may file an objection to the proposed water use using DNRC Form 611.

4. Field office attempts to resolve objection/complaint via field inspection and meeting with affected parties.

5. If objection is not resolved, a DNRC hearing is scheduled.

6. A hearing examiner will litigate the case and make a decision to either grant, modify, or deny the water use permit application.

7. The final order is issued and signed by the hearing examiner and the Water Resources Division administrator.

8. A decision or an order can be appealed within 30 days.The decision or order may also be litigated in water court. DNRC's jurisdiction includes water rights issues. DNRC does not have jurisdiction over water quality issues.

Contact: Department of Natural Resources and Conservation
1520 East Sixth Avenue
Helena, MT 59601
(406) 444-6601

or

Kalispell Area Field Office
Kalispell, MT 59901
(406) 752-2288

42. *How would the increased power needs of the mine affect management of the Noxon Reservoir? Would it cause greater fluctuations in the water level?*

Response: Power generated by Washington Water Power Company at the Noxon Rapids Dam is fed into the Interconnected Power Grid, a transmission grid serving the entire western United States. Therefore, the sale of retail power to ASARCO would not affect the operation of Noxon Rapids dam or reservoir, although it would decrease the sale of wholesale power to other entities that presently buy power from the transmission grid. As a point of information, the stage in Noxon Reservoir fluctuates about 10 feet in a typical year.

43. *Would improving the existing road for mine access add sediment to Rock Creek? Would U.S. Forest Service roads further increase sedimentation?*

Response: See Chapter 4, Hydrology.

44. *How would acidity and soluble metals levels affect surface and ground water?*

Response: See Chapter 4, Hydrology.

45. *In accordance with the Montana Water Quality Bureau classification system, what water quality standards are applicable for surface and ground water in the project area?*

Response: See Chapter 4, Hydrology.

46. *What is a "moderate" effect on ground water quality? How can we be sure this is an acceptable limit? How is this calculated?*

Response: The term "moderate" in describing impacts to water quality is subjective. Waters receiving mine discharge either meet or do not meet criteria and standards established for protection of the state's surface and ground water resources. It is the responsibility of DHES and DSL to enforce Montana's Water Quality Act (MCA 75-5-101) and Metal Mine Reclamation Act (MCA 82-4-300), thereby ensuring that water quality in receiving streams meets appropriate standards or criteria.

Impacts to receiving streams and aquifers can be quantified using a "conservation of mass" methodology. In its simplest form, the concentrations and volumes of a potential source and a receiving stream must equal the combined concentration and volume after the source and receiving stream mix.

47. *Would ASARCO have to obtain a discharge permit?*

Response: ARM 16.20.904 specifies that the owner or operator of any point source discharging pollutants into state waters shall file a MPDES permit application with DHES no less than 180 days prior to the day operations commence. ASARCO has indicated that the proposed project would discharge to the Clark Fork River. ASARCO submitted its MPDES permit application in 1994 and revised and resubmitted the application March 10, 1995. The permit would not be approved until this EIS is final.

48. *How would ASARCO treat mine water before using it in the mine or discharging it into environment?*

Response: See Chapter 2, Alternative II.

49. *Would discharge be treated to meet standards set by the Water Quality Board? How would it be monitored?*

Response: ASARCO must comply with all stipulations contained in an MPDES permit. If the permit required that effluent be treated prior to discharge, then ASARCO would have to comply. The Agencies would require monitoring of the effluent prior to and after treatment. See Chapter 4, Hydrology.

50. *Would cyanide be used in the mine operation?*

Response: ASARCO indicates that sodium cyanide would not be used as a reagent in the ore concentrating process.

51. *What precautions would ASARCO take to ensure that ore mined prior to mill construction would not contaminate Rock Creek and/or other water sources during the ore's storage?*

Response: The Rock Creek Mine construction and development schedule provided by ASARCO indicates that limited production would start after all processing facilities were in place and operational. ASARCO has also suggested that any ore mined during the exploration adit construction would be stored near the portal and ore encountered in constructing the mine adits would be stockpiled at the plant site.

52. *How would nonpoint source pollution problems that might develop during construction and/or operation of the mine be identified?*

Response: Seepage from the tailings impoundment would be identified most readily by assessing the project's water balance. This would involve observations of tailings impoundment water level. Loss of process water from seepage through the base of the impoundment, coupled with data on tailings water quality, would provide the information necessary to determine potential impacts to ground or surface water quality. Comparison of surface and ground water quality data collected during operational monitoring with data collected during the baseline period would help identify problems associated with mining activities.

53. *Can adit water be contained?*

Response: The response to Hydrology question 48 discusses how adit water would be handled during the operational phase. After mining ceased, ASARCO proposes to either discharge water of acceptable quality to the Clark Fork River or close mine access adits by using water-tight, reinforced concrete bulkheads. Chapter 4, Hydrology discusses the effectiveness of mine-adit closure.

54. *Would ASARCO delineate floodplains and calculate flood frequencies along pipeline corridor and stream crossings?*

Response: ASARCO would delineate the 100-year flood plain for three perennial stream crossings at the time of final design. As a rough approximation of the 100-year floodplain, ASARCO has provided DSL with a map depicting the 10-foot flood stage.

55. *Former detection limits for heavy metals by procedures used during the Troy Mine water analysis were not sensitive enough to disclose levels of biological toxicity. Will these inadequate procedures be replaced by chemical methods designed to be sufficiently sensitive?*

Response: Water quality criteria for some metals are based on hardness. Rock Creek is a low-hardness stream. For example, the average hardness is approximately 10 milligrams per liter of calcium carbonate. Therefore, the fresh water aquatic life criteria for those metals that are based on hardness are also low. Water samples would be analyzed using the lowest possible detection limits established by the U.S. Environmental Protection Agency. Appropriate methods for the determination of metals in environmental samples are summarized in Circular WQB-7 (DHES 1994), and would be incorporated in the final quality assurance project plan (QAPP) for the project, if approved.

56. *More stringent QA/QC procedures should be employed in ASARCO's water quality testing during the gathering of baseline data and during the monitoring of operations.*

Response: The Agencies' conceptual water resources monitoring plan for the Rock Creek project includes a Quality Assurance Project Plan (QAPP). The QAPP describes the policy, organization, functional activities, and quality assurance/quality control activities necessary to achieve the data quality objectives defined for the project. Critical indicators of project data quality are precision, accuracy, representativeness, and comparability.

57. *Please require a third-party contractor to perform the water quality sampling.*

Response: Water quality sampling and analysis would be performed during project construction, operation, and postoperational periods. The roles and responsibilities of ASARCO and the agencies for various aspects of water resources monitoring are provided in the water resources monitoring plan. Currently, surface and ground water samples would be collected by ASARCO or ASARCO's consultant, with third-party oversight by the regulatory agencies.

58. *The final report and management plan of the Clark Fork/Pend Oreille Basin Study should be incorporated into all the alternatives. The EIS should ensure that three of the "priority" recommendations from the management plan are applied to the ASARCO mine: 1.) "enforce an aggressive nondegradation policy with respect to nutrient sources." 2.) "Establish numeric nutrient loading targets for the Clark Fork River." That means that ASARCO should be part of any wasteload allocation process for the river. 3.) Recommended maximum "instream concentrations of phosphorus and nitrogen" in the river should not be exceeded. That means any proposed changes in quality for surface waters by ASARCO should ensure that instream concentrations stay below these levels.*

Response: Please refer to Chapter 4, Hydrology. Alternatives III and IV provide options for limiting nitrate loading to the Clark Fork River. In addition, the Board of Health and Environmental Sciences would make a decision regarding effluent limitations and enforcement of Montana's nondegradation policy.

59. *Is the water monitoring program designed to dovetail with the baseline data?*

Response: Water resources monitoring stations incorporated in the baseline data collection program would continue to be used to monitor surface and ground water resources during the operational period of the proposed project. Comparison of operational water quality data with data collected during the baseline investigation would be used to document potential changes in water quality.

60. *How has water quality changed in Lake Creek? The Kootenai?*

Response: This question apparently refers to impact to Lake Creek from the ASARCO Troy Mine when the mine was still in operation. The DHES Water Quality Division has indicated that while there were several tailing impoundment seeps, pipeline breaks, and documented spills, the Troy Mine operation did not have any long-term detrimental effects on water quality in Lake Creek or the Kootenai River. Water quality of Lake Creek and the Kootenai River are beyond the scope of this EIS.

61. *What is the quality of the Clark Fork? What is the primary contaminant and where does it come from?*

Response: Baseline water quality data for the Clark Fork River at Noxon Bridge and Below Cabinet Gorge Dam are summarized in Chapter 3. These data indicate that the concentrations of most analytes are below federally established maximum contaminant levels, and are low enough to meet the criteria established to protect cold-water aquatic life. The concentrations of metals and nutrients in the Clark Fork River probably reflect current and historic mining, industrial, and municipal activities including, but not limited to, discharges from upstream Superfund sites, city wastewater treatment plants, paper mills, and a variety of industrial discharges. Additional chemical and nutrient loading to the Clark Fork River and Lake Pend Oreille results from leaking domestic septic systems, the use of laundry detergents containing phosphate compounds, and application of fertilizers, herbicides, and pesticides.

62. *At the meeting in May 1987, Mr. Erskine of ASARCO stated repeatedly that there were no water quality problems at the Troy Mine - that the State was happy with the water quality. What is the State's response to this?*

Response: Please refer to the response to question 60.

63. *Are the measures planned for use in mitigation of water quality concerns "best available technology" or the most cost-effective?*

Response: ASARCO would be required to meet the effluent limitations set forth in the MPDES permit issued by the DHES. The Agencies would require water quality impacts to be mitigated using a best avoidable technology that is reasonable in cost to implement. See Chapter 2 for a description of the proposed water treatment method as well as methods dismissed from further consideration.

64. *The water quality analysis for the Clark Fork should include modeling of pollution effects in a reservoir environment, with less mixing/dilution than would be expected for a free-flowing river.*

Response: Please refer to Chapter 4, Hydrology. The water quality analysis presented in Chapter 4 is based on a mass loading analysis. For example, the loading of total suspended sediment, nutrients, and metals is calculated on a daily basis. A mass balance analysis is also provided. This analysis estimates the resulting concentration in the Clark Fork River assuming instantaneous and complete mixing of water from the proposed project with the receiving stream. The assumption of instantaneous and complete mixing is valid upstream of Lake Pend Oreille, and the MPDES permit would likely be written taking into consideration the concentration of the discharge and the mass loading of constituents relative to the load of constituents in the receiving stream.

65. *Respondent would like to see all excess water applied to the land by sprinkling.*

Response: Please refer to Chapter 2. The advantages and disadvantages of several water treatment methods, including land application disposal (LAD) by sprinkling, have been examined and appear to have siting and operational constraints that would limit their application and effectiveness.

66. *ASARCO must address how it will treat mine water before using it in the milling process or discharging it into the surrounding environment. How will adit discharge water be treated and handled: percolation ponds, land application, direct discharge to river?*

Response: Please refer to chapters 2 and 4. ASARCO proposes to discharge excess mine water to the Clark Fork River after treatment in a facility located near the tailings impoundment. Mine water would be conveyed to the Clark Fork River in a buried 12-inch polyethylene pipeline.

67. *Alternatives for "treatment" of discharges should include examination of measures and technologies that reduce pollution at the source.*

Response: Please refer to Chapter 4, Hydrology. Source control alternatives include intercepting natural ground water within the mine before it reaches active mining areas. In addition, best management practices could be followed to ensure careful handling of explosives containing nitrogen compounds that have the potential to mix with mine inflow water.

68. *Estimated mine flow is 112-168 gal/min with a filter system that can only handle a maximum of 200 gal/min. Handling of this situation needs to be further addressed in EIS.*

Response: The maximum mine inflow is estimated to be about 2,000 gallons per minute. ASARCO proposes to store water in an underground reservoir for use as make-up water at the mill, and discharge any excess water to the Clark Fork River after treatment.

69. *Considering that leaching through the sides and bottom of the proposed impoundment area will likely continue well beyond the 21st Century, one would hope that the sampling period would be commensurate with the risk involved. Clearly, any errors in analyzing the disruption of a natural system should favor that natural system. The pilot project...could use a surface layer of tailings from the Troy Mine nearby, which, although not identical to the tailings from the lower Cabinet Mountains, should provide sufficiently equivalent data for review.*

Response: See Chapter 4, Hydrology.

## AQUATICS/FISHERIES

1. *Do the baseline data provided adequately describe the existing aquatic life in Rock Creek and the Clark Fork River to allow adequate analysis of the effects of the alternatives on aquatic life?*

Response: The baseline data are sufficient for purposes of developing this EIS. However, more baseline data would be needed for monitoring the impacts of the project (see **Appendix H**).

2. *What are the potential effects of the project on aquatic life in Rock Creek, Clark Fork River, and Lake Pend Oreille?*

Response: Chapter 4, Hydrology and Aquatics/Fisheries, describes the potential effects of the project on aquatic life.

3. *How would seepage from the tailings impoundment affect aquatic life?*

Response: Seepage from the tailings impoundment would be controlled through the use of a seepage collection system. This system would be designed to eliminate the potential for migration of pollutants to Rock Creek and the Clark Fork River see Chapter 4, Hydrology.

4. *Will the Rock Creek drainage be inventoried for the Coeur d'Alene salamander, a sensitive and declining species?*

Response: Yes. See Chapter 3, Biodiversity.

5. *Have adequate baseline data on aquatic insects been collected? Will an aquatic insect monitoring program be planned?*

Response: See response to question 1.

6. *What effect does the toxicity of processing reagents (chemicals used to process ore by floating and concentrating the mineral) have on surface water, aquatic life, wildlife, and humans? Will data on all eight reagents be used to test this on all appropriate species?*

Response: See Chapter 4, Aquatics/Fisheries, describes impacts to aquatic life from reagents.. **Appendix F** describes reagents and their associated human health risks.

7. *Where would the reagents go?*

Response: See the Chapter 2, Chapter 4, and **Appendix F** discussion of processing reagents and the project water plan.

8. *How would aquatic life be monitored during construction, operation and reclamation phases to adequately assess impacts?*

Response: See **Appendix H** for the operational monitoring plan. A postoperational monitoring plan for aquatic resources would be developed and implemented at a later date during the life of the project via an agreement between the Agencies and ASARCO.

9. *Would steps be taken to mitigate impacts to the pure-strain native westslope cutthroat trout in Rock Creek?*

Response: Fisheries mitigation is discussed in chapters 2 and 4 and in **Appendix H.**

10. *The EIS should fully address how the impacts to water quality would affect fish. Bald eagles nest on the lower Clark Fork River, Pend Oreille Lake, and Pend Oreille River and could be negatively affected by contaminated fish, including game and nongame species of fish.*

Response: See Chapter 4, Aquatics/Fisheries. For impacts to bald eagles, see Chapter 4, Threatened and Endangered Species.

11. *How will project activities affect westslope cutthroat and bull trout populations or habitat?*

Response: See Chapter 4, Aquatics/Fisheries.

12. *What are the fish and wildlife and water quality effects of placing the tailings pond in the alternative site proposed in McKay or Swamp creeks?*

Response: For impact discussion on McKay Creek, see Chapter 2, Alternatives Considered but Dismissed and **Appendix I.** Swamp Creek was dismissed from further study (see Chapter 2, Alternatives Considered but Dismissed.)

13. *How will our fish habitat be controlled - fish, plants, seasonal controls?*

Response: See chapters 2 and 4 (Aquatics/Fisheries) and the Agencies' conceptual monitoring plan in **Appendix H.** No modifications to current fishing regulations are proposed as a result of this project.

14. *Stock Rock Lake with genetically pure Westslope Cutthroat Trout and restore native species to Lake, Meadow, and Rock creeks.*

Response: Montana Department of Fish, Wildlife and Parks is considering this option.

15. *Will the discharge have any effect on the edibility of fish?*

Response: See Chapter 4, Aquatics/Fisheries.

## SOILS

1. *How would soil losses adversely affect long-term productivity and reclamation of disturbed areas?*

Response: See Chapter 4, Soils and Reclamation.

2. *(a) Disclose the presence of areas of unstable soils which could result in mass movement, including maps that show land and soil types in the environmental analysis.*

*(b) Discuss the actual effectiveness of proposed BMPs in safeguarding water quality. What BMP failures have been noted for past projects? A thorough discussion of the BMPs and a listing, including*

*their relative effectiveness in achieving their intended goal, based upon experience in the area, should be included in the EIS.*

Response: (a) Unstable soils have been identified within the permit boundary (see Chapter 3, Soils and Chapter 4, Soils and Reclamation). Soil types are shown in detailed maps in the Permit Application. Additional working maps used for the analysis are located in the project file at DSL.

(b) Mitigation and monitoring plans have been developed by ASARCO to minimize soil erosion and potential sedimentation that may result from construction or operation of the project. Additional measures have been presented by the Agencies. See discussions in Chapter 2 and Chapter 4, Soils and Reclamation and Hydrology.

## VEGETATION

1. *Will Rock Creek drainage be inventoried for rare plants to determine whether special management is required to ensure long-term viability of rare species?*

Response: Sensitive plants were searched for while conducting the baseline inventories (Scow, Culwell and Larsen *In* ASARCO, Incorporated 1987-1994; and WESTECH 1993). The Forest Service is preparing a biological evaluation in accordance with Forest Service directive (FSM 2670.5, FSM 2672.41, and R-6 FSM 2673.41) to address impacts and mitigations. To compensate for the loss of several populations, the Agencies will require ASARCO to develop a mitigation plan. See also chapters 3 and 4, Biodiversity.

2. *How would the proposed operation affect rare plants in the project area?*

Response: The project would affect several sensitive plant populations. See Chapter 4, Biodiversity.

3. *How would mining operations affect old growth?*

Response: See discussions in chapters 3 and 4, Forest Plan, and Biodiversity.

4. *There is a state rare plant along Highway 200, Pacific blackberry. Although this is an interesting occurrence, it is not very close to the project, nor is it particularly sensitive.*

Response: Pacific blackberry (Rubus ursinus) is a component of several vegetation types identified in baseline studies. However, it is no longer considered a species of concern by MTNHP or by KNF. See discussions in chapters 3 and 4, Biodiversity.

5. *The Rock Creek drainage has not been inventoried in any systematic fashion for rare plants. There are several species on the Forest Service sensitive species list which may occur here. The area should be surveyed by a botanist familiar with the sensitive plant list for the KNF. Discovery of rare*

*species may not preclude development, but could require a management plan to ensure the long-term viability of the species in other populations.*

Response: See responses to questions 1, 2, and 4, above.

6. *Biodiversity: (a) We insist that it is an absolute necessity that thorough surveys for Proposed, Threatened, Endangered, and Sensitive species and management indicator species be conducted before NEPA documents are finalized so that there is an opportunity to comment on the adequacy of proposed mitigation.*

*(b) The Ecology Center specifically requests that the analysis address the related issues of "population viability" and "distribution throughout its geographic range."*

*(c) Please include in your analysis the possible effects of noxious weed introduction on sensitive plan populations and other components of biodiversity.*

*(d) Please include in the analysis the results of the monitoring of noxious weed infestation from past management actions in the area.*

Response: (a) See responses to questions 1, 2, 4, and 5, above and Chapter 4, Biodiversity, and Threatened and Endangered Species.

(b) The Forest Service is preparing a biological evaluation and a Biological Assessment (**Appendix B**) in accordance with Forest Service directive (FSM 2670.5, FSM 2672.41, and R-6 FSM 2673.41) that addresses these concerns. Plant distribution is also discussed in ASARCO's baseline inventory documents. See Chapter 4, Biodiversity, and Threatened and Endangered Species.

(c) See Chapter 4, Biodiversity and response to (6.b) above.

(d) Noxious weeds occurrences were discussed in ASARCO's baseline inventory. See Chapter 4, Biodiversity.

7. *The meadows in the East Fork of Rock Creek, though disturbed by past mining activity, support a unique plant regime for this area. An extensive sphagnum bog is located here. Will it be disturbed in any way by mining activity?*

Response: The area mentioned appears to be the same area referred to on some maps as Rock Creek Meadows. This area is well outside the permit boundary and would not be affected by the proposed project. In any case, wetlands (none of which are sphagnum bogs) that would be disturbed have been identified by ASARCO and a mitigation plan has been submitted to the Agencies. See discussions in chapters 2, 3, and 4, Waters of the U.S. and Wetlands.

## THREATENED AND ENDANGERED (T&E) SPECIES

1. *Are the baseline population estimates adequate to assess long-term impacts of the mine on threatened and endangered species?*

Response: Baseline population estimates are adequate to assess impacts of the mine on Threatened and Endangered species. Additional studies and literature were used as well.

2. *How would the proposed mine facilities (portal, mill site, utility corridor, impoundment area, railroad siding) and operation directly affect the habitat, space, and populations of threatened and endangered species such as the grizzly bear, bald eagle, and peregrine falcon?*

Response: See Chapter 4, Threatened and Endangered Species; and **Appendix B**. (Pursuant to Section 7 of the federal Endangered Species Act, the Forest Service must prepare a biological assessment for any threatened or endangered species in a project area when a project requires permitting or approval by the Forest Service.)

3. *What would be the indirect effects on threatened and endangered species?*

Response: Indirect effects to threatened and endangered species would be related to any increase in human population and resulting increase in use of habitat (e.g., subdivisions, recreation). See Chapter 4, Threatened and Endangered Species and **Appendix B.**

4. *Will this proposal consider the proposed program to increase the local grizzly bear population? How would these projects affect each other?*

Response: The augmentation program was considered as part of the cumulative effects analysis on the grizzly bear population. See Chapter 4, Threatened and Endangered Species, and **Appendix B.**

5. *Will alternative mill site locations be evaluated to minimize impacts on the grizzly bear and wilderness values?*

Response: Yes. See Chapter 4, Threatened and Endangered Species, and Wilderness.

6. *How would potential subdivision development, especially in the Bull River Valley, affect grizzly bear habitat? What mitigating measures would be developed?*

Response: See Chapter 4, Threatened and Endangered Species and **Appendix B.**

7. *How would mitigation measures for threatened species suggested by the Agencies affect future management of national forest system lands and adjacent private lands?*

Response: It is anticipated that mitigation measures would be consistent with past actions taken to mitigate for activities on the forest. Future management on NFS lands will follow guidance in the Forest

Plan. Any mitigation measures taken on private lands would have to be accepted by the private landowner or instigated by the county or state. The Forest Service has no jurisdiction over private land activities.

8. *Would a grizzly bear mitigation program be developed before construction began?*

Response: Yes. A mitigation plan specifically for the grizzly bear is required and is displayed in Chapter 2 and **Appendix B**.

9. *How would mitigation measures for the grizzly that were applied to ASARCO's initial exploratory work be adapted to reflect the potential for increased impacts from full-scale development?*

Response: Mitigation measures would be applied commensurate with the need to maintain adequate habitat for threatened and endangered species. Legally, mitigation measures must be developed to ensure the continued existence of the grizzly bear. New mitigations that reflect the impacts of full-scale development are listed in **Appendix B**.

10. *How would the grizzly be affected by the cumulative impacts of locally hostile attitudes (and consequent illegal killing of grizzlies), subdivision, a bear population at low numbers, a possibly prolonged drought that is partially due to intensive logging, road construction, and the proposed mine?*

Response: Cumulative effects were analyzed in **Appendix B** and are summarized in Chapter 4, Threatened and Endangered Species.

11. *How would the grizzly bear be affected by the possible future development of smelter facilities in the area?*

Response: No smelter facilities have been proposed. If they were proposed, potential impacts would be addressed in a separate document.

12. *Would ASARCO help mitigate impacts to the grizzly by contributing to the National Audubon Society's program of cash reward for information leading to conviction of individuals who illegally kill grizzly bears, penalizing its employees convicted of violating road closures or illegally killing grizzlies, educating its employees to avoid grizzly bear encounters, and contributing to preservation of open space?*

Response: Mitigation measures required of ASARCO are identified in Chapter 2 and in **Appendix B.**

13. *Will the EIS include an ecosystem-wide map of vegetation, protein sources, and other grizzly bear habitat needs?*

Response: The EIS and biological assessment (**Appendix B**) provide enough information to analyze impacts within the scope of the proposed project. Other ecosystem-wide data is available to the public at Forest Service offices.

14. *Would wildlife habitat losses caused by the mine be offset through additional road closures, grizzly augmentation, key habitat acquisitions, further wildlife studies, and continuing efforts to educate the public on wildlife values? Would ASARCO support these measures?*

Response: Any of these mitigation measures is possible. Need for such actions will be determined through the biological assessment process and in consultation with the U.S. Fish and Wildlife Service. It is unknown whether ASARCO would support mitigation.

15. *Would road closures be monitored?*

Response: All road closures are monitored. Personnel and budget limitations make total enforcement of closures difficult. Closure monitoring includes reports from forest users, forest personnel observing problems, and specific law enforcement patrols. Proposed mitigation is discussed in Chapter 2, and Chapter 4, Threatened and Endangered Species, and Biodiversity.

16. *How effective are the bear management units (BMUs) and/or subunits that would be affected by the project?*

Response: See chapters 3 and 4, Threatened and Endangered Species, and **Appendix B**.

17. *Cumulative effects analysis in the Cabinet/Yaak Ecosystem, a small ecosystem, cannot be limited to a single "bear management unit" (BMU). An analysis of one BMU without attention to activity in adjacent BMUs is an analysis out of context, and one that ignores important effects.*

Response: See Chapter 4, Threatened and Endangered Species, and response to question 16.

18. *What research, if any, has been done to gauge the specific effect of the Troy Mine on grizzly bears and other endangered species? What conclusions can be drawn from this research?*

Response: There has been no research done to gauge the specific effect of the Troy Mine on grizzly bears or other threatened or endangered species. However, the Troy Mine was within the Cabinet-Yaak Ecosystem Grizzly Bear and Black Bear Research Project, funded jointly by the U.S. Forest Service and U.S. Fish and Wildlife Service. Information gained from this research has been used to develop road density standards and other protective measures for grizzly bears.

19. *The mine is in designated Situation I grizzly habitat. The Endangered Species Act mandates federal agencies to take no action which will jeopardize the continued existence of an endangered species or will adversely modify the critical habitat of such species. The very presence of the mine is in direct conflict with this. Insufficient study has been done to identify options to reduce the impacts to the grizzly bear.*

Response: See Chapter 4, Threatened and Endangered Species and **Appendix B.** The USFWS is the agency responsible for determining if the project constitutes "Jeopardy" to threatened or endangered species. USFWS's biological opinion will be included as part of the Final EIS.

20. *Will mining operations/facilities require that adjacent land be "locked up" for wildlife displacement (grizzly bear)?*

Response: The current agreement between the USFWS and Forest Service is that a replacement Bear Analysis Area (BAA), with no activity, be available for each BAA with activity proposed. See **Appendix B.**

21. *In the impact analysis of grizzly bears, include an analysis of north-south corridor effectiveness in the project area.*

Response: An analysis of linkages for grizzly bear is included in Chapter 4, Threatened and Endangered Species and **Appendix B.**

22. *ASARCO has not adequately addressed what they will do to insure the safety of the grizzly bear. A program must be in place before construction begins.*

Response: A mitigation plan would be prepared prior to project implementation. The plan would be prepared by the Forest Service. A conceptual plan is described in Chapter 2 and **Appendix B.**

23. *New scientific research by Allendorf, Harris, and Metzgar (1991) is now available that shows the KNF is critical to the survival of a viable population of grizzly bears. This means that all currently suitable habitat must be protected, and corridors linking the sub-population areas must also be protected. Please consider this new research site-specifically.*

Response: See Chapter 4, Threatened and Endangered Species.

24. *Is any of the area involved in the project presently within grizzly bear recovery area?*

Response: Yes. The entire project area is in a grizzly bear recovery zone (the Cabinet/Yaak ecosystem).

25. *What are the potential conflicts on fall grizzly bear habitat use, particularly huckleberry fields, and how will they be addressed?*

Response: Conflicts are displayed in Chapter 4, Threatened and Endangered Species and **Appendix B.**

26. *How will project activities or associated activities affect the use of the Clark Fork River corridor between Thompson Falls and Idaho by the wintering flock of 35-50 bald eagles?*

Response: See Chapter 4, Threatened and Endangered Species and **Appendix B.**

27. *The EIS should address potential impacts to bull trout, and whether the project would affect transfer of genetic material from populations in the Clark Fork to Lake Pend Oreille bull trout populations. With bull trout considered for threatened and endangered listing, and spawning populations*

*confined to limited ares in the Lake Pend Oreille system, periodic transfer of genetic material from upstream populations may be important in maintaining genetic viability.*

Response: Effects to bull trout are displayed in Chapter 4, Aquatics/Fisheries.

## WILDLIFE

1. *Are the baseline studies adequate to assess long-term impacts of the proposed mine on wildlife?*

Response: ASARCO complied with wildlife survey requirements as originally agreed to by the Agencies. Since studies were performed 10 years ago, they may be somewhat outdated on the basis of age. Additional data have been collected to supplement the original baseline studies.

2. *How would mountain goats, mountain sheep, elk, black bear, and other wildlife be directly affected by the mine?*

Response: See Chapter 4, Biodiversity.

3. *What would be the indirect effects on wildlife?*

Response: See Chapter 4, Biodiversity.

4. *Will the Agencies analyze criteria such as indicator species to determine possible impacts on wildlife?*

Response: The impact analysis focuses on indicator species. See Chapter 4, Biodiversity.

5. *How would the influx of employees affect the hunting of wildlife, the enforcement of game laws, and the outfitter industry?*

Response: See Chapter 4, Biodiversity, and Recreation.

6. *What potential is there for accidental poisoning of wildlife by the tailings pond, stored reagents, and blasting compounds?*

Response: The potential risk to most wildlife is negligible. Impacts would be greatest for water-dependent species. See Chapter 4, Hydrology, and Aquatics/Fisheries.

7. *Will proposed powerline corridors provide access to formerly roadless habitat? If so, how will that affect habitat quality and security for elk?*

Response: The proposed powerline would follow existing or proposed reconstructed FDR No. 150 in habitat used by elk but not considered "roadless". The effects of the powerline corridor on elk are considered in Chapter 4, Biodiversity.

8. *The proposed rail siding could interrupt an important travel route for wildlife coming off of Government Mountain to drink from the Clark Fork River.*

Response: It is possible that wildlife travel routes from Government Mountain to the Clark Fork River could be disrupted by the proposed rail load-out. It is expected that some wildlife could alter their travel routes to avoid it. However, the railroad is already in existence and wildlife do cross it to access the river.

9. *How will neotropical migrant birds and herptiles be affected? Will they be monitored?*

Response: It is not well understood how neotropical migrant birds or herptiles would be affected. See Chapter 4, Biodiversity. Monitoring plans are discussed in Chapter 2 and **Appendix H**.

10. *Are animals going to be affected by noise from the project?*

Response: See Chapter 4, Biodiversity and Sound.

11. *How will the proposed activities impact species that depend upon vast areas that are relatively inaccessible to people? These include increasingly rare species such as grizzly bear, gray wolf, wolverine, fisher, pine marten, and lynx. The analysis should fully discuss the impacts of making these animals more accessible to trapping pressure due to the increased access.*

Response: See Chapter 4, Biodiversity and Threatened and Endangered Species.

12. *Development of a large mine in the Cabinet Mountains near the Idaho border has the potential to effect Idaho wildlife, particularly species that range large distances or prey on fish as a primary food source. Mine-related disturbances could affect dispersal and genetic viability of these species. Areas that should be avoided during the development phase include talus slopes and meadows. Road networks should be kept to a minimum.*

Response: State borders were not a limiting parameter on wildlife analysis. See Chapter 4, Biodiversity.

13. *How will the project activities affect the use of the Cliff Lake kidding area? Rock Meadows is a major goat wintering area. How will project activities and potential associated human activity in the East Fork of Rock Creek affect wintering animals?*

Response: Areas discussed in Chapter 4, Biodiversity, include Cliff Lake, Rock Creek Meadows, and the East Fork of Rock Creek.

14. *Goats tend to summer in Libby and Ramsey creeks above the Montanore Project and winter in Rocky Meadows. What will be a cumulative effect of increased disturbances on both seasonal ranges on mountain goat productivity, survival, and populations?*

Response: See Chapter 4, Biodiversity.

15. *What mitigation efforts are being considered for mountain goats in the area?*

Response: See Chapter 2, Alternative III.

16. *With the high-standard road, elk travel routes will be intersected. Will this be mitigated?*

Response: See Chapter 2, Alternative III.

## AIR QUALITY

1. *What impacts to air quality would occur as a result of the mine operations and facilities, including the intake adits, mill site, and tailings impoundment?*

Response: See Chapter 4, Air Quality.

2. *What would be done to mitigate potential unacceptable adverse impacts to air quality?*

Response: See Chapter 4, Air Quality for the specific emission control techniques proposed by ASARCO.

3. *What effect would airborne particulates, especially from the impoundment area, have on surrounding vegetation?*

Response: Particulate levels would remain well below the ambient standards; therefore, the effect on vegetation should be minimal. See Chapter 4, Air Quality.

4. *Would mill site air quality exceed existing standards for that area?*

Response: See Chapter 4, Air Quality.

5. *Are existing air quality standards for a Class I airshed applied to underground portions of the mine?*

Response: Air quality standards applicable to Class I airsheds are "ambient" standards. Ambient air is defined as that portion of the atmosphere external to buildings, to which the general public has access. These standards are therefore not applicable inside a mine. The U.S. Department of Labor Mine Safety and Health Administration and the Montana Department of Labor and Industry, Safety Bureau, regulate occupational health matters inside mines. Mine ventilation exhaust is addressed in Chapter 4, Air Quality.

6. *What standards would be used to check wilderness and nonwilderness air for compliance?*

Response: See chapters 3 and 4, Air Quality.

7. *Has ASARCO filed a preconstruction visibility monitoring plan with its air quality permit request? Has ASARCO submitted an existing visibility analysis?*

Response: ASARCO was not required to perform preconstruction (existing) visibility monitoring as part of its air quality permit application. An analysis (computer modeling) of the project's visibility impacts was submitted and is described in Chapter 4, Air Quality.

8. *Where would drill and blast exhaust be vented? (Where and how far would it travel?)*

Response: During project operation, the exploration adit would be the primary mine exhaust ventilation emission point. During initial mine development, the service adit would be used for exhaust ventilation. The resulting impacts of all emissions are described in Chapter 4, Air Quality.

9. *Would gases from the milling process escape the mill? Would the gases have unpleasant odors or affect air quality?*

Response: See Chapter 4, Air Quality. Some milling reagents may be odorous, but based on similar operations, this should only be perceptible in the immediate mill area.

10. *What steps have been taken for dust control?*

Response: See Chapter 4, Air Quality.

11. *Would ASARCO be required to continually monitor air quality in the mine and at the mouths of all vents to ensure maintenance of air quality?*

Response: See response to Air Quality question 5 and **Appendix H.** Monitoring required by the air quality permit would be at or beyond the permit boundary in order to be representative of ambient air. MSHA requires ASARCO to monitor the air within the mine.

12. *What air quality monitoring equipment would be used? Where would it be located? How often would the equipment be checked?*

Response: See **Appendix H.**

13. *How big an area of the Cabinet Wilderness must be polluted before the Clean Air Act is considered to be violated?*

Response: Any violations of ambient air quality standards, emission standards, or air quality permit conditions are considered violations of the Clean Air Act.

14. *What steps would be taken if violations occurred?*

Response: The following enforcement actions are possible: 1) attempt to obtain voluntary compliance through warning, conference, or any other appropriate means; 2) issuance of a notice of violation, which may contain an order to take corrective action; 3) issuance of an order to discontinue operation; and 4) initiation of civil and criminal penalties. The type of enforcement action taken is dependent on the severity of the violation and the company's response to it.

15. *Is mine shutdown an option if other measures fail to prevent air quality violations?*

Response: Yes; see response to question 14.

16. *If the mine were expected to repeatedly violate air quality standards, would it be illegal to permit the proposed project?*

Response: It would be illegal to permit a proposed project if the impact analysis indicated violations of air quality standards. The applicant is required to verify compliance in the air quality permit application, and DHES must review this during its application review.

17. *What is the State's air quality permit application review and approval process? How does this process tie into the EIS process?*

Response: The Air Quality Division would issue a Preliminary Determination on the application at about the same time as issuance of the Draft EIS, assuming the application was complete. The application would be available for public review and comment during the comment period on the draft EIS. A final permit decision would be made following issuance of the final EIS.

18. *Is baseline data being gathered? Will baseline data be available to compare against air quality data generated after mine construction begins?*

Response: Baseline air quality monitoring was done in the project area from November, 1984 through February, 1986. See Chapter 3, Air Quality. The full baseline report is on file at DSL.

19. *Could ventilation in the proposed mine be improved over that in ASARCO's Troy Mine?*

Response: See response to question 5.

20. *Will ventilation shaft located in the Cabinet Mountain Wilderness be intake or exhaust? If intake, how will the air be heated? If exhaust, how will condensation plume be evaluated vis-a-vis the air quality designation for the area?*

Response: The ventilation adit in the wilderness would serve as an air intake. The air quality permit application states that propane burners would be used to heat intake air at the conveyor adit on an as-necessary basis from November through March. It is assumed that a similar procedure would be used at the ventilation adit.

## SOCIOECONOMICS

1. *How many jobs would be created by the mine?*

Response: See Chapter 4, Socioeconomics.

2. *Would more workers come in for construction than for the actual mine operation?*

Response: See Chapter 4, Socioeconomics.

3. *What is ASARCO's maximum operation employment at Rock Creek?*

Response: See Chapter 4, Socioeconomics.

4. *Would some Troy mine workers come to work at Rock Creek? How would this affect the numbers of people coming into the community?*

Response: It is not known how many Troy mine workers, if any, would remain in the area at mine opening. Employment of former Troy workers at the Rock Creek mine would not change the assumptions regarding the number of newcomers moving to the study area.

5. *Would local residents be given preference in hiring?*

Response: ASARCO has indicated that it intends to hire 80 percent of its mine operations work force locally. For the purposes of the EIS, "local hire" means employing a resident of Sanders County. ASARCO plans to provide training to develop worker skills.

6. *Would current ASARCO employees be provided first opportunity for employment at the Rock Creek Mine? Would transfers affect wages, seniority, retirement, etc.?*

Response: It is not known whether former Troy Mine workers would be given first opportunity for employment at Rock Creek or whether former Troy mine workers would have different wages or employee benefits.

7. *What percentage of jobs would go to local residents vs. nonresidents?*

Response: An estimated 50 percent of the construction work force is expected to be local residents, as is 80 percent of the mine work force. See Chapter 4, Socioeconomics.

8. *Would ASARCO be able to meet its claimed "local hire" ratio and provide maximum job opportunities for locals?*

Response: ASARCO should be able to achieve an 80 percent local hire ratio for its operations work force. There are many workers in the study area with skills that are transferable to underground mining (see Chapter 4, Socioeconomics). For instance, loggers with experience in operating heavy equipment and machinery have skills that can be used in mining jobs. Furthermore, ASARCO has stated that it intends to provide intensive training programs for employees. A survey of the Troy Mine work force conducted by ASARCO in 1988 indicated that 83 percent of the surveyed Troy mine workers lived in Lincoln or Sanders county before accepting a job at the Troy Mine.

If "maximum job opportunities" means that ASARCO hires all of its Rock Creek work force from Sanders and Lincoln counties, then the project would not provide maximum job opportunities. However, if a local hire ratio of 80 percent would provide "maximum job opportunities," then ASARCO would be expected meet the criterion.

9. *How can local hiring for both union and nonunion positions during construction and operation be guaranteed?*

Response: The company could survey applicants to determine their former residence. Accuracy of the results depends on the design and administration of the survey.

10. *How can hiring of Montanans during construction and operation be guaranteed?*

Response: See response to Socioeconomics question 8, above.

11. *What would wage levels be? Would they be competitive with wages at other mines?*

Response: See Chapter 4, Socioeconomics, for explanation of gross wages ASARCO would pay Rock Creek employees. It is not known whether such wages would be competitive with wages at other mines. Presumably wage levels would be equivalent with other mines or employees could change jobs to increase incomes.

12. *How can the prevailing wage be assured?*

Response: Assurance of wage rates and wage levels is beyond the scope of the EIS.

13. *Would contracts be let for such services as trucking?*

Response: It is not known which services would be contracted. In its permit application, ASARCO states that most of the project construction would be contracted.

14. *What is the employee turnover at Troy, and what can be expected at the proposed mine?*

Response: The employee turnover at the Troy operation is not known. That information is beyond the scope of the EIS. However, ASARCO provided the following response to DSL's request for information regarding employee turnover.

> "Employee turnover rates at one operation are not indicative of what the turnover rate at a new operation will be at some future date. Typically, the turnover rate at a new mining project is extremely low. As the mine matures, the turnover rate usually increases and then remains fairly constant every year. Many factors influence a turnover rate: the local economic climate, the wage structure's competitiveness with the local industry, the longevity of the project, etc. ASARCO was able to obtain the turnover rate at four mines located in similar economic and rural settings as the Rock Creek Project. The average turnover at each mine for the last five years was: 17.2, 17.4, 24.9, and 26.6 percent. It is important to realize these figures do not mean a certain percentage of all employees is involved in the turnover" (Dave Young, ASARCO, Incorporated, letter to DSL, Aug. 17, 1988).

15. *What happens to people thrown out of work by shutdown or closure?*

Response: See Chapter 4, Socioeconomics.

16. *Is there a possibility the ASARCO and Noranda projects could be run sequentially instead of simultaneously to prolong employment?*

Response: It is not the role of state or federal agencies to dictate when companies may develop resources. As long as permitting and operating regulations are satisfied, companies can pursue development when they determine it to be profitable. The possibility of scheduling these projects to run sequentially would depend on the plans of companies involved and the economic benefits that would accrue to the companies. See Chapter 2, Alternatives Considered but Dismissed From Further Study.

17. *How soon can the project be approved so people can go to work?*

Response: Project approval is contingent upon the company completing permitting requirements in a timely manner, the publication of the draft and final EIS, and the approval of the mine permit conditions. After completion of the permitting process and any litigation settlements, development would proceed according to timelines dictated by ASARCO and an approved permit.

18. *What training programs would be provided for employees? Where would they be conducted; how long would they last; who would provide the training; and what would be covered?*

Response: ASARCO has stated that intensive training (including both classroom instruction and onsite task training) would be conducted by ASARCO and by equipment specialists.

19. *Will ASARCO be required to provide documented reasons for its conclusion that the Rock Creek mine would not attract employees from Idaho?*

Response: See Chapter 4, Socioeconomics.

20. *How would the project affect the area's employment, income, population, geographic distribution of population, schools, welfare and other public services, local and state tax revenues, and public expenditures?*

Response: See Chapter 4, Socioeconomics.

21. *Although the social and economic impacts to Sanders County will be addressed, how would Lincoln and Bonner counties be affected?*

Response: Lincoln and Bonner county impacts are addressed in Chapter 4, Socioeconomics.

22. *What other local governments would be affected?*

Response: See Chapter 4, Socioeconomics.

23. *Will socioeconomic baseline data be provided by the company before the Agencies determine the application/plan of operation to be complete?*

Response: Yes, these data have been submitted and are reflected in the socioeconomic sections of chapters 3 and 4.

24. *What effect would the project have on the local cost of living, especially housing? How would the older population be affected?*

Response: See Chapter 4, Socioeconomics.

25. *How would the temporary construction workers be housed?*

Response: See Chapter 4, Socioeconomics.

26. *Who would be responsible for long-term worker care, the state, the county, or the company?*

Response: County welfare programs are administered by the county and receive funding from state and federal sources. If a worker loses employment and has no other income or resources, the county or state may provide public assistance benefits. Medical care for work-related injuries is provided by the state through workers' compensation benefits. Retirement income may come from a variety of sources, including the company, the federal government (social security), and the retiree's own resources. The analysis of long-term worker care is beyond the scope of this EIS.

27. *Would ASARCO assist governments and schools in paying up-front costs and additional operating costs that resulted from mine-related population growth?*

Response: Yes; see Chapter 1, Agency Roles and Responsibilities, Hard Rock Mining Impact Board/Sanders County.

28. *Will ASARCO provide information on the expected value of ore to be mined annually, projected value of its equipment and facilities, and projected annual payroll so local governments can assess expected tax revenues?*

Response: Yes; see Chapter 4, Socioeconomics.

29. *What would be the cumulative impact of the Rock Creek Mine and Noranda's proposed Montana Project mine on local taxes, including gross proceeds tax, personal property taxes, and taxes on equipment?*

Response: Because the projects are geographically separated, ASARCO would impact mainly Sanders County, and Noranda's Montana Project would impact mainly Lincoln County. Impacts to areas where the projects overlap are discussed in Chapter 4, Socioeconomics.

30. *How would property values and taxes on land around the tailings impoundment be affected?*

Response: The value and future use of private lands adjacent to the tailings impoundment would probably be affected by the project. Although the properties may become less valuable as residential sites, their value for commercial or industrial uses may increase.

31. *What changes have occurred in the social fabric of Troy (local businesses, housing, schools, crime, taxes, unemployment) since ASARCO moved in?*

Response: Analysis of the socioeconomic characteristics of Troy before and after the Troy Mine became operational is beyond the scope of this EIS. This EIS does consider the impact of the Troy Mine as it contributes to the cumulative impacts of the Rock Creek and Noranda projects to Lincoln and Sanders counties. See Chapter 4, Socioeconomics.

32. *When Troy opened, local unemployment rose 40 percent. Will this type of effect be considered in the impact analysis?*

Response: Historical unemployment rates for the study area are listed in Chapter 3, Socioeconomics. Unemployment in the study area has been high in comparison to other Montana counties. There are many causes, primarily the cyclical, natural resource-based economy in the study area.

It seems likely that ASARCO would be able to hire 80 percent of its operational work force locally. To prevent unemployed persons from migrating to Sanders and Lincoln counties in search of mining jobs, ASARCO could advertise that jobs were already filled. Such conditions could be written as part of the hard rock mine impact plan negotiated by the counties and the company.

33. *Would there be an economic boom/bust effect?*

Response: See Chapter 4, Socioeconomics.

34. *What is the process for identifying increased needs and costs for local governments due to the project?*

Response: See Chapter 1, Agency Roles and Responsibilities, Hard Rock Mining Impact Board/Sanders County.

35. *With the anticipated population increase, where would solid wastes be disposed? Would the Trout Creek landfill be adequate?*

Response: See Chapter 4, Socioeconomics.

36. *Would the project influence the initiation of zoning in Noxon?*

Response: Sanders County does not have a comprehensive plan, nor do any municipalities within the county. Because Noxon is unincorporated, it would require development of a special local planning district before any land use planning and subsequent zoning could occur.

37. *What kinds of demands would be made on western Sanders County ambulance and fire services? Would ASARCO have its own fire suppression equipment and trained employees at the mine or use the Noxon fire department?*

Response: See Chapter 4, Socioeconomics.

38. *What problems would be caused by the lack of local medical facilities, given the expected population growth? What could be done to solve anticipated problems? What would be ASARCO's role in the solution?*

Response: See Chapter 4, Socioeconomics and Chapter 1, Agency Roles and Responsibilities, Hard Rock Impact Board/Sanders County.

39. *How would disabled miners affect local health and welfare services?*

Response: See response to question 26, above.

40. *What kinds of long-term local purchases would be made by ASARCO?*

Response: It is not known what type of local purchases ASARCO would make.

41. *What effect would fluctuations in employment levels at the mine have on the local economy, particularly on the ability of people to continue to pay house mortgages and maintain their standard of living?*

Response: Employment fluctuations at the mine would have the same effect as fluctuations in other industries. Lifestyle impacts would be minimal if an unemployed mine worker had other income and resources adequate to provide interim support until another job became available.

42. *What effect would fluctuating metals prices, production, and decisions by management to reduce work forces have on schools, housing values, and government services?*

Response: See Chapter 4, Socioeconomics.

43. *Will the EIS address the local social and economic impacts that would occur when the mine discontinued operation?*

Response: See Chapter 4, Socioeconomics.

44. *What would be the effects of mine closure on incomes, employment, taxes, and local businesses?*

Response: See Chapter 4, Socioeconomics.

45. *How would mine closure affect the abilities of schools and local governments to fulfill financial obligations?*

Response: See Chapter 4, Socioeconomics.

46. *To what extent has ASARCO mitigated economic impacts of the Troy Mine?*

Response: ASARCO was not and is not obligated to offer any economic impact mitigation for the Troy Mine since the mine was constructed before mitigation plans were required. However, grants may be available from the Metal Mines Tax funds to mitigate economic impacts caused by the Troy Mine shutdown.

47. *How would the Fiscal Impact Plan be developed in accordance with the Montana Hard Rock Mining Act to identify and mitigate potential impacts attributable to mine development? Would a mitigation plan be finalized before operations begin?*

Response: See Chapter 1, Agency Roles and Responsibilities, Hard Rock Mining Impact Board/Sanders County.

48. *Does the impact act provide for reimbursement for county services such as sheriff, mental health, drug and alcohol rehabilitation, etc.?*

Response: See Chapter 1, Agency Roles and Responsibilities, Hard Rock Mining Impact Board/Sanders County.

49. *How would the Montana Tax Base Sharing Act be used to reduce financial impacts to counties, cities, towns, school districts, and special districts not having taxing jurisdiction over the mine site?*

Response: See Chapter 1, Agency Roles and Responsibilities, and Chapter 4, Socioeconomics.

50. *Will ASARCO obtain the expertise to address and comply with the Hard Rock Mining Impact Act?*

Response: Yes; ASARCO has retained Economic Consultants Northwest, of Helena, to prepare the plan.

51. *The south end of our claim will be heavily impacted by office and shop buildings, parking area, powerlines, ditches and security fences. The northwest corner will contain conveyors and powerlines. It appears that approximately one-third of our claim will be made inaccessible to us.*

Response: Bureau of Land Management records indicate that the claimant maintains a lode mining claim in the southwest quarter of section 34, T27N, R32W, P.M. This is also the location of ASARCO's proposed mill facilities. Since 1982 the claimant has submitted to the Kootenai National Forest (KNF) yearly Notices of Intent to work the claim. KNF records indicate that the claimant's activities have been minor in scope and directed towards prospecting/exploration and sampling with hand tools. The claimant has not proposed any additional activities. ASARCO also maintains claims over this area (lode claims and mill sites) and has been authorized to conduct information-gathering activities. Both parties have apparently been able to perform their work without interference from the other's activities. For the time being, this is not expected to change. The situation could change, however, if ASARCO is permitted to construct its mill facility as proposed.

As part of the Agencies' project analysis, an alternative mill site has been studied at the confluence of the East and West forks of Rock Creek, approximately 1 mile southeast of the commentor's claim. This is the Agencies' preferred Alternative IV. Alternative IV would provide for continued access up FDR No. 150, thereby not interfering with the claimant's future access or exploration. Implementation of Alternative II (ASARCO's proposal) or III may interfere with the claimant's right of reasonable access and ability to continue activities on the claim. The Forest Service has no authority to adjudicate rights between claimants. If the claimant concludes that his/her rights of reasonable access and exploration may be significantly impacted he/she may work with ASARCO to arrive at a satisfactory arrangement.

52. *How can the community and the company cooperate to "improve" the social environment and minimize negative impacts?*

Response: ASARCO is preparing its Hard Rock Mining Impact plan to moderate negative impacts to local governments. Additional possibilities to "improve" the social environment could be suggested during impact plan discussions between ASARCO and local governments.

53. *How much is the Troy Mine closure costing local, state and federal government? Does this closure have a minimal effect on the local economy, tax base and services? If not, was it projected in the EIS and was the disruption counted as a cost against the benefits that were cited? Economic projections for the ASARCO mine should include this analysis.*

Response: The effects of the Troy Mine shutdown are beyond the scope of the EIS. See response to Socioeconomics question 31.

54. *How would project (water quality, aesthetics) diminish or change adjacent (impacted) property values?*

Response: See response to Socioeconomics question 30.

55. *Could the company sponsor small businesses that are NOT subject to boom and bust cycles? (a business incubation approach)*

Response: See response to question 52.

56. *How much money will ASARCO get from the Rock Creek Mine?*

Response: See Chapter 4, Socioeconomics.

57. *A new nondegradation petition must be submitted and it will have to, under new rules that could be finalized this summer, include more detail on the economic and social tradeoffs of degradation.*

- *The impacts and costs of the non-permanent nature of the jobs produced.*
- *Potential future liability to the State of adverse environmental conditions.*
- *Opportunity costs.*

Response: Comment noted.

58. *Does ASARCO have the right to condemn private property for mine facilities?*

Response: No private lands are proposed for condemnation. Any condemnation action would be limited to the authorized project permit area.

59. *Would the tourist industry be negatively impacted, not just during the expected life of the project, but beyond as well, due to mining- related activities?*

Response: See Chapter 4, Socioeconomics, and Scenic Resources. To the extent that reduced visual quality and increased local wage structures affected tourism, the project would impact tourism. These effects would decrease following mine closure.

## LAND USE

1. *How would these operations affect other resources and subsequent uses, such as logging, backpacking, and huckleberry picking on adjacent national forest, wilderness, and private land?*

Response: See Chapter 4, Biodiversity, Wilderness, and Recreation. The proposed mine would not affect activities on private land other than that which ASARCO owns.

2. *How would this mine (and the possible future Noranda mine) affect the amount of timber harvest in the area?*

Response: See Chapter 2, Reasonably Foreseeable Activities and Chapter 4, Hydrology and Aquatics/Fisheries.

3. *Could management activities in the area as described in the Kootenai Forest Plan occur as planned, or would they need to be modified to accommodate the proposed operations?*

Response: This is discussed in Chapter 4, Hydrology, Forest Plan, and Aquatics/Fisheries and will be discussed in the Forest Service Record of Decision.

4. *Would any land change ownership as a result of the project? Specifically, would any federal land go into private ownership? What would happen to that land at the end of the operations?*

Response: There is no plan to exchange NFS lands for private land because of this project. Lands to be managed for additional grizzly bear habitat, however, could change from private to public ownership. See Chapter 4, Threatened and Endangered Species and **Appendix B**. Once in operation, ASARCO could apply for patent to those NFS lands occupied by the mill.

5. *Would private property be subject to federal and/or state regulations after the life of the project?*

Response: Areas disturbed by facilities would be subject to provisions of the reclamation plan until reclamation criteria were satisfied and the reclamation bond released.

6. *The proposed project EIS should include assessment of changes in the previously planned activities as mentioned in the forest plan.*

Response: Impacts for the reduction of scope of proposed KNF timber sales are discussed in Chapter 4, Hydrology and Aquatics/Fisheries. Management area revisions are discussed in Chapter 4, Forest Plan.

## RECREATION

1. *Is baseline data on recreation adequate to address impacts of the proposed project?*

Response: Yes; baseline data have been determined to be adequate.

2. *How would the project affect recreational use patterns of the immediate and general areas?*

Response: See Chapter 4, Recreation.

3. *How would the project affect the value of the immediate and general areas for recreational activities?*

Response: See Chapter 4, Recreation.

4. *How would the project affect the commercial recreation industry in the area?*

Response: See Chapter 4, Recreation.

5. *Would the project affect access to recreational areas such as Chicago Peak, Rock Lake, Rock Lake Meadows, Rock Creek, and Government Mountain? Would recreational access be restricted as in the area near ASARCO's Troy Mine?*

Response: See Chapter 4, Recreation, Wilderness, and Threatened and Endangered Species.

6. *Would the Chicago Peak Road stay open to the public?*

Response: See Chapter 4, Recreation, Wilderness, Threatened and Endangered Species, and Transportation. A 2.5-mile portion of Chicago Peak Road is proposed to be closed to restrict motorized vehicle access.

7. *If any roads need to be closed, I feel that a plausible closure would be from Snort Creek to Basin Creek. This would give the animals some protection during hunting season, and it would give the public access to most of the places that are already used.*

Response: Comment noted.

8. *What will be the Forest Service reaction or policy on: population increase on National Forest recreation facilities and day use, and impact on the land such as trails use, camp use, and lake and stream use?*

Response: See Chapter 4, Recreation.

9. *Define "General Area" for recreational activities. Would Sandpoint be considered under "General"?*

Response: Effects to recreational activities were analyzed for the Rock Creek drainage and, in a more general sense, for western Sanders County. Sandpoint was not considered in the general area.

## CULTURAL RESOURCES

1. *Would the proposed project impact any cultural resources?*

Response: No significant cultural resources were encountered during the cultural resource inventory. See chapters 3 and 4, Cultural Resources.

2. *What would be done to mitigate any impacts to the cultural resources?*

Response: No mitigation would be necessary since there are no significant resources.

3. *What would be done if, during operations, a cultural resource were disturbed?*

Response: The National Historic Preservation Act requires that cultural resources uncovered during construction must be recorded and evaluated. If cultural resources were uncovered during mine construction, construction should stop immediately, the cultural material left in place, and the KNF supervisor's office contacted. The office would work with a cultural resources contractor to bring the project back into compliance with Section 106 of the act.

## SCENIC RESOURCES

1. *How would the visual resource of the area be affected by implementation of the project?*

Response: See Chapter 4, Scenic Resources.

2. *What could be done to mitigate impacts to the visual resource?*

Response: See Chapter 4, Scenic Resources, and Soils and Reclamation.

3. *Would features associated with this project be viewed from critical viewpoints along Highway 200 or in the Cabinet Wilderness?*

Response: See Chapter 4, Scenic Resources.

4. *How would the tailings pond affect the view? Are there alternative sites for the tailings pond? Could a site away from Montana Highway 200 be found to reduce visual impacts?*

Response: See Chapter 2, Identification of Issues and Development, Alternatives Process, and Chapter 4, Scenic Resources.

## SOUND

1. *How much noise would be associated with the project, especially the concentrating plants?*

Response: See Chapter 4, Sound.

2. *How far away would noises be heard?*

Response: See Chapter 4, Sound.

3. *Are there any noise pollution standards; if so, what are they?*

Response: See Chapter 4, Sound.

4. *What could be done to mitigate noise pollution associated with the project?*

Response: See Chapter 4, Sound.

5. *How much truck traffic will use the overpass, Rock Creek Road, and the highway junction, and will it be heard as far as Noxon?*

Response: See Chapter 4, Transportation, and Sound.

## WILDERNESS

1. *What visual, noise, and air quality impacts to the wilderness resource would occur as a result of the project?*

Response: See Chapter 4, Wilderness, Air Quality, and Sound.

2. *What would be done to mitigate these impacts?*

Response: See Chapter 2, Alternatives Description.

3. *What would be the effects of the air intake vent on the wilderness?*

Response: See Chapter 4, Wilderness, and Sound.

4. *Could the air intake vent be located outside of the wilderness? If not, why not?*

Response: The exploration adit located outside the wilderness will be used to exhaust outlet from the mine. A final determination for the need of a ventilation (air intake) adit in the wilderness cannot be made until actual underground development has occurred (probably around year 15 of operations. It may be required to meet MSHA standards. Also see worker safety questions 1 and 7.

5. *If ground subsidence occurred, would it occur within the wilderness?*

Response: See Chapter 4, Geology, and Hydrology.

6. *Can the project occur without long-term degradation of the wilderness resource?*

Response: See Chapter 4, Wilderness.

7. *Will alternative locations be considered to avoid impacts on the wilderness?*

Response: Yes; see Chapter 2, Identification of Issues and Development of Alternatives Process.

8. *Since ASARCO's mining patent rights have been granted under the wilderness, and surface right denied (in wilderness), is the wilderness character skin deep? (surface only)*

Response: See Chapter 4, Wilderness.

9. *Please do a thorough job of validating the boundaries of the roadless areas affected by the proposal. What would the direct, indirect, and cumulative effects be to the wilderness and roadless areas?*

Response: See Chapter 4, Wilderness. No effects to Roadless Area Review and Evaluation (RARE) II roadless area have been identified.

10. *Cite specific areas in the Wilderness Act that allow mining under the wilderness or allow ventilation adits within the wilderness.*

Response: See chapters 1 and 4, Wilderness.

## TRANSPORTATION

1. *What traffic (kinds and amount) would be associated with these proposed operations?*

Response: See Chapter 4, Transportation.

2. *What routes of travel would be used by this traffic?*

Response: See Chapter 4, Transportation, and Chapter 2, Alternatives Descriptions.

3. *How would the project affect traditional road use of the area?*

Response: See Chapter 4, Transportation, and Recreation.

4. *How would the traffic related to the project affect road conditions?*

Response: See Chapter 4, Transportation.

5. *How would the increased road maintenance needs be paid for?*

Response: ASARCO would be responsible for maintenance on FDR No. 150 from Montana Highway 200 to the plant site. If the Forest Service or other interests propose additional road use, the proposed additional use and allocation of construction and maintenance costs would be on a cost-use basis. This would be defined in a road use agreement with the Forest Service and other proposed users. Upon completion of mining activities, maintenance responsibility would return to the Forest Service.

6. *May ASARCO build their roads as soon as the permits and operating plan are approved?*

Response: No work may start until ASARCO posts the reclamation bond.

7. *Who would assume responsibility/liability for the access road to the mine?*

Response: ASARCO would assume responsibility.

8. *What impacts, especially to wildlife and water quality, could be associated with the proposed upgrading of Forest Development Road 150?*

Response: See Chapter 4, Transportation, Biodiversity, Aquatics/Fisheries, and Hydrology.

9. *How would ASARCO deal with culverts, erosion control, and revegetation in regard to its road-building activities?*

Response: See Chapter 4, Transportation, and Soils and Reclamation. Standard construction specifications and best management practices deal with culvert installation, erosion control, and revegetation for any road-building.

10. *What is the possibility of building the railroad north of Highway 200 to the Rock Creek road to prevent hauling ore the 11-mile round trip to Noxon?*

Response: See Chapter 2, Identification of Issues and Development of Alternatives Process and Alternatives Considered but Dismissed From Further Study.

11. *What emergency plans cover the ore concentrates after they leave the mill site by truck and as they leave Montana by train?*

Response: Spill contingency plans for the accidental release of potentially toxic substances such as process chemicals or fuels are contained in the application and will become part of the operating permit. The ore concentrate is a largely inert material and would pose little hazard to humans or natural systems if spilled during transport. It is beyond the scope of this EIS to address transportation of the ore once it is loaded on the train.

12. *Will the EIS consider alternative means of transportation of refined material to the railroad siding, such as the use of electric trucks, railcars, conveyers, or moving the railroad siding closer to Rock Creek?*

Response: Only alternative rail siding locations and ore truck haul routes were considered (see Chapter 2, Alternatives Considered but Dismissed From Further Study). See response to question 10 above.

13. *Will the EIS investigate alternative methods of loading ore concentrate onto trucks for transportation, such as using a loading hopper instead of scoop loaders, to reduce the chances of concentrate spilling on the ground?*

Response: The method proposed by the company is adequate and doesn't warrant alternative investigations.

14. *If a service road is built for the mine, then it is my understanding that equal miles of Forest Service roads must be closed to compensate for the new miles of road.*

Response: See Chapter 4, Biodiversity, and Threatened and Endangered Species for discussion about open road density requirements to protect the grizzly bear.

15. *Is the compartment adjacent to the wilderness meeting road density standards? If not, close the road leading to the edge of the wilderness (not East Fork Rock Creek) up on the ridge.*

Response: See Chapter 4, Threatened and Endangered Species and **Appendix B.**

16. *Will ASARCO provide bus services to and from the mine site?*

Response: See Chapter 4, Transportation. Bus service is an option ASARCO could exercise.

17. *Can "Central Tire Inflation" be required on trucks to reduce wear and tear on roads and highway?*

Response: With FDR No. 150 being paved and FDR No. 150B being graveled, ASARCO could use central tire inflation if they chose. The Agencies have not required its use.

18. *Would increased project traffic (workers and project trucks) diminish the quality of life of the households along Highway 200 and along the Rock Creek Road?*

Response: See Chapter 4, Sound, and Air Quality.

## MINE ENGINEERING AND OPERATIONS

1. *Would mine facilities (portals, mill sites, utility corridors, impoundment area) be located to avoid natural hazards or designed to mitigate adverse effects?*

Response: One objective of the Montana and National environmental policy acts is to formulate project alternatives that mitigate adverse impacts to public health, welfare, and the environment. In the case of the proposed ASARCO Rock Creek Mine, DSL and the Forest Service must solicit public input and select the preferred alternative, which may or may not be the alternative that mitigates all adverse effects. Natural hazards are discussed in chapters 3 and 4, Geology.

2. *How would surface subsidence from the mine be prevented both during and after the operation period?*

Response: See Chapter 4, Geology and Hydrology.

3. *Why not move the mill site down to the junction of the east and west forks of Rock Creek?*

Response: See Chapter 2, Alternatives Descriptions.

4. *What would happen to underground excavations after mining is complete? Would they fill with water, collapse; would they be sealed off with bulkheads?*

Response: See Chapter 4, Geology and Hydrology.

5. *What surface waste management actions would be taken?*

Response: See Chapter 2, Alternatives Descriptions.

6. *Why not place the operation facilities underground?*

Response: It would expand the waste rock dump dramatically. This would produce a long-term alteration of the landscape that removal of facilities at the end of the operation would not produce.

7. *Why not dispose of tailings and waste rock underground in the mined-out areas, utilizing solidifiers?*

Response: See Chapter 2, Alternatives Considered but Dismissed From Further Study, and **Appendix E.**

8. *Would ore body beneath Cliff and Copper lakes be mined?*

Response: See chapters 3 and 4, Geology.

9. *How would electrical degreasers such as trichlorophane and other toxic substances be handled and disposed of?*

Response: Toxic substances must be handled in accordance with all appropriate federal and state environmental regulations. These substances are not discussed in this EIS.

10. *What other minerals in addition to silver and copper would be processed from the mine?*

Response: ASARCO has not proposed mining any other minerals.

11. *Would the waste rock be considered for the starter dams of the tailings impoundment instead of other borrow material?*

Response: See Chapter 2, Alternatives Description. Use of waste rock is proposed in part for starter dam construction for alternatives III and IV.

12. *What effect would unanticipated electrical power failure have on environmental safeguards and on introduction of harmful emissions into the air or water? Of special concern is the intake fan in the wilderness area adit; how would diesel emission into the wilderness be prevented?*

Response: In the event of electrical power failure, the ability to spray the surface of the tailings may be lost, increasing the potential for wind erosion emissions. Some mine air could exhaust from the intake adit in the wilderness area; however, air pollutant generating sources in the mine would also be curtailed by the power failure and total emissions would be minimal. A short-term power failure (several hours) would not cause any harmful emissions into the water. In the event of a long-term failure (several days), diesel generators could be brought in to keep systems functioning, such as the impoundment's pump-back system.

13. *Will alternative fuels (to diesel) be considered for use underground?*

Response: The fuel type to be used is at the discretion of the company as long as it is able to meet the rules and regulations for underground mining, listed in response to question 1.

## RECLAMATION

1. *How would ASARCO's reclamation plan minimize unacceptable soil erosion and weed invasion?*

Response: See Chapter 2, Alternatives Descriptions and Chapter 4, Soils and Reclamation.

2. *What would be the condition and use of the tailings impoundment after the mine closed?*

Response: See Chapter 2, Alternatives Descriptions and Chapter 4, Soils and Reclamation, and Scenic Resources.

3. *What would happen to the road, mine and mill sites, etc., after the project closed?*

Response: See Chapter 2, Alternatives Descriptions and Chapter 4, Geology, Soils and Reclamation, and Scenic Resources.

4. *Is the reclamation plan available to the public? Has the plan been found adequate or is it possible?*

Response: The reclamation plan is a part of ASARCO's application for an operating permit/plan of operations. The plan is summarized in Chapter 2 of the EIS. However, the entire plan is available to the public at the Forest Service offices in Libby and Trout Creek, or at the DSL, Helena office.

The EIS evaluates the potential consequences of the proposed operating and reclamation plans. A determination of the plans' adequacy will be made by the Forest Service in a Record of Decision (ROD) that may be included in the final EIS. DSL may issue its decision no sooner than 15 days following completion of the final EIS. See Chapter 2, Alternative Descriptions, and Chapter 4, Hydrology, Soils and Reclamation, and Scenic Resources.

5. *Upon abandonment, would the tailings impoundment be capable of accepting probable maximum flood inflow safely and automatically without operator assistance?*

Response: After reclamation of the tailings pond, runoff from the probable maximum flood (pmf) for watersheds upstream (northeast) of the tailings pond would be diverted to Rock Creek on the southeast, and to an unnamed creek on the northwest, in diversion ditches engineered to accept the pmf.

6. *What are the details of the reclamation plan concerning the waste rock dump site, leaching of heavy metals into Rock Creek at the mill site, continued seepage into ground water at the tailings pond, and reclamation of the tailings pond area?*

Response: See Chapter 2, Alternatives Descriptions, and Chapter 4, Hydrology, Aquatics/Fisheries, and Soils and Reclamation.

7. *Is the proposed topsoil depth to be used in reclamation sufficient to support vegetation?*

Response: See Chapter 4, Soils and Reclamation.

8. *Will the reclamation bond be sufficient?*

Response: Yes, it is required by law to be sufficient. See Chapter 1, Agency Roles and Responsibilities.

9. *Would reclamation be stable or require long-term maintenance? Who would pay?*

Response: See Chapter 2, Alternatives Descriptions and Chapter 1, Agency Roles and Responsibilities and Chapter 4, Soils and Reclamation.

10. *The reclamation plan should ensure there will be no potential for discharge of pollution after the mine has been closed and reclaimed. It should also ensure that reclamation does not have to depend on future Montanans maintaining postmining environmental protection actions such as water treatment plants.*

Response: The reclamation plan includes plans for diverting surface waters around disturbed areas, where necessary, to prevent water pollution or unnecessary erosion. It also includes plans to reclaim stream channels and banks to control erosion, siltation, and pollution, and to provide measures to prevent objectionable postmining ground water discharges. If diversions and/or stream reclamation did not control siltation, erosion or other water pollution damage, then some form of perpetual treatment would be required. (See Chapter 2, Alternatives Descriptions, MCA 82-4-303(15) and 82-4-336, and ARM 26.4.106, 26.4.160(9)(b)(vi), and 26.4.164(1)(d).) A separate bond for water treatment (see Chapter 1, Agency Roles and Responsibilities) would be calculated by DSL, and ASARCO would file a secured bond with the State.

11. *The plan of operations and/or EIS should contain: an analysis of potential reclamation problems, a complete analysis of a range of reclamation options for all disturbed lands, analysis of a range of cyanide detoxification techniques and toxicity levels relative to all cyanide processed at the mine, timing standards and completeness requirements of all reclamation activities, appropriate reclamation bonds.*

Response: There is no cyanide leaching process associated with this proposed project and therefore no impact analysis of that subject is required. The requirements for operating plans for exploration, mining, and mills are specified in Sections 26.4.102-105, 26.4.107, and 26.4.163, ARM, respectively. The requirements for a reclamation plan are stated in Section 26.4.106, ARM. See Chapter 2, Alternatives Descriptions, for information pertaining to these plans and ASARCO's Exploration and Hard Rock Operating Permit Applications for more detail. These applications were considered complete as of July 1993 and November 1989, respectively.

The EIS is required to contain the assessment of impacts or effects on the quality of the human environment caused by the proposed mining project as described by the operating and reclamation plans in the permit application (see Chapter 4). Alternatives were developed by the Agencies to mitigate, minimize or, if possible, eliminate impacts associated with issues that were determined to be significant (see Chapter 2, Identification of Issues and Alternative Development, and Chapter 4). Sections 26.2.642 through 652, ARM, and 40 CFR Part 1502 contain the requirements pertaining to EIS preparation and contents.

It is not known what was meant by "timing standards". The time sequencing of reclamation and revegetation practices is assessed in Chapter 4. Assessing the sequence of milling operations is beyond the scope of this document unless some aspect of the process impacts the environment, such as discharging process water to surface or ground water. Such assessments would also be found in Chapter 4.

## WORKER SAFETY

1. *Can working conditions within the mine, such as safety and air quality, be a condition of permit or operation plan approval?*

Response: Issues concerning worker health and safety are outside the scope of an EIS. NEPA and MEPA rules require agencies to consider potential impacts to the natural and physical environment and the relationship of people to that environment (emphasis added). An underground mine is not the natural environment of people. In addition, neither NEPA nor the Part 228 mining regulations provide direct authority for including worker safety and health in the EIS or in the operating plan/permit process. The same is true of MEPA and other corresponding Montana laws.

The U.S. Department of Labor, Mine Safety and Health Administration (MSHA), and the Montana Department of Labor and Industry, Safety Bureau, regulate worker safety and health at mines. The Federal Mine Safety and Health Act of 1977 applies to the project and includes provisions for inspections, training, penalties for noncompliance, worker health and safety standards, ventilation and air quality inside underground mines, and approval of diesel-powered equipment for noncoal mines (30 USC, 801 et seq.; 30 CFR parts 32 and 57). Corresponding Montana laws/regulations are MCA 50-72-101 et seq. and ARM 24.30.1301.

2. *Will the EIS address the potential for mine air quality problems to adversely affect the health of mine workers? Will it address the effect of potential long-term costs to public health agencies?*

Response: See the response to Worker Safety question 1.

3. *What are the anticipated health effects of diesel fumes, silica, and other airborne particulates inside the mine?*

Response: See the response to question 1. Questions of this nature should be referred to ASARCO, MSHA, or Montana Department of Labor and Industry, Safety Bureau.

4. *Can the state investigate the possibility of using electric equipment instead of diesel?*

Response: The state could investigate the use of electric equipment but does not have authority to require its use, unless there were significant environmental advantages to its use.

5. *Why doesn't the state compensate for silicosis?*

Response: This question is outside the scope of the EIS and should be referred to the Worker Compensation Division, Montana Department of Labor and Industry.

6. *With regard to workers' compensation, how many people have been hurt at the Troy mine? When? What kinds of settlements have been paid and when?*

Response: A copy of the worker's compensation claims and amounts paid may be obtained by making a written request for a "loss report run" from the Montana Department of Labor and Industry (Division of Worker's Compensation).

7. *Could ventilation in the proposed mine be improved over that in ASARCO's Troy Mine?*

Response: ASARCO's ventilation system design and operation must meet U.S. Department of Labor, Occupational Safety and Health Administration, and Mine Safety and Health Administration standards for respiratory emissions.

8. *Does the high employee turnover at the Troy mine indicate unhealthy work conditions?*

Response: See the response to Worker Safety question 1.

9. *What are the effects of working underground for 20 years?*

Response: See the response to Worker Safety question 1.

10. *Has the Troy mine been tested for arsenic and radon? If so, what were the results?*

Response: See the response to Worker Safety question 1.

11. *How often would the proposed mine be inspected? Would the frequency of inspection be sufficient?*

Response: Frequency of inspections would consider the development phases of the mine. Inspections would be frequent during the construction phase. Routine inspections would be made during operations, both in response to citizen complaints and the inspection schedules of KNF and DSL. Frequency of inspections would be sufficient to monitor ASARCO's operation.

12. *Will the ventilation design be adequate for protection of the worker's health?*

Response: See response to questions 1 and 7.

13. *How many times has the Troy Mine been inspected by the Safety Board for ventilation problems relative to worker health? Is the mine management notified of these visits? Have there been any worker complaints as regards ventilation?*

Response: The figure requested is not readily available. MSHA is bound by law to inspect a mine four times a year. More inspections may be conducted if quarterly inspections indicate a need. Support is available from MSHA's Denver office to perform ventilation surveys. Visits by MSHA are unannounced. The number of complaints is not readily available.

14. *Worker health and safety: This is of primary concern of MSHA (state and federal). Are there any other agencies that would have any authorities and responsibilities?*

Response: See response to question 1 for agencies directly involved with normal inspection. If hazardous materials or concerns about such are raised, the EPA would most likely get involved. The Department of Health and Environmental Sciences would get involved if water quality or air quality (above ground) problems arose.

15. *How will employees be assured that their grievances will be followed up on when reported to MSHA?*

Response: MSHA is bound by law to respond to all complaints as long as enough information is provided. Once they complete the investigation, the complainant is provided a copy of the report as is the company. The complainant remains anonymous throughout the process.

16. *Could an independent safety and environmental monitoring board/person insure the environment and safety is protected (both underground and above)?*

Response: State and federal agencies are responsible for conducting safety and environmental monitoring for the mine (both underground and above). There is no indicator of a need for additional or replacement monitoring programs.

17. *If it is anticipated that sulfide ores will be encountered, the application and the EIS should address sulfide ore mining, the environmental hazards that result from sulfide ore mining, and proven mitigation and reclamation measures.*

Response: See Chapter 4, Hydrology.

18. *Are the local medical facilities adequate to respond to mining accidents? What are the local medical facilities?*

Response: Yes, see Chapter 3, Socioeconomics.

19. *Please ensure that a comprehensive QA/QC plan is developed, adopted, and implemented as part of the operating plan.*

Response: A quality assurance/quality control (QA/QC) plan would be part of the permitting process.

20. *How could worker safety be assured?*

Response: No agency involved in inspections can assure worker safety; they are charged with trying to make the workplace as safe as possible.

21. *Send a survey form to every person who worked at the Troy Mine, asking them to write about health and safety hazards they encountered while working there.*

Response: The avenue for employee concerns has been discussed above. If it was determined after inspection that the concern had merit, the agencies would have required ASARCO to remedy them.

22. *There is a need for ASARCO to provide adequate worker safety training for mine workers.*

Response: Safety training is the responsibility of the company. MSHA has standards for training needed by job task and provides materials to the company to help facilitate training. MSHA also provides grants to the state to provide training. The Montana Department of Labor is the agency that provides training at no cost to companies.

23. *There is a need for safety standards and a "rule book" other than the company's.*

Response: See response to question 1.

## MISCELLANEOUS

1. *Will this EIS consider the likelihood of a future smelter in the general area?*

Response: No; the Agencies know of no proposed plans for a smelter in the general area in the foreseeable future.

2. *What right, considering applicable mining laws, the Wilderness Act, and the Threatened and Endangered Species Act, does ASARCO have to access and mine this ore body?*

Response: The Federal Mining Act of 1872 allowed ASARCO to file claims on this ore body. The Wilderness Act provides that mine developments may occur within the wilderness where valid existing rights to mineral have been determined. The Montana Metal Mine Reclamation Act, Title 82, Chapter 4, part 3, et seq., MCA, provides the legal requirement and methods for ASARCO to obtain a permit to mine its patented claims. The Montana Environmental Policy Act (MEPA), Title 75, Chapter 1, MCA, and Section 26.2 et seq., ARM, and the National Environmental Policy Act (NEPA) Regulations, 40 CFR Part 1500, describe the process required to assess environmental impacts of projects requiring state and/or federal actions. These laws require that a mine, such as is proposed by ASARCO, be conducted in an environmentally responsible manner and comply with all applicable environmental and mining laws and regulations including the Wilderness Act and the Threatened and Endangered Species Act.

3. *Will it be determined whether the Wilderness Act of 1964 or the Endangered Species Act take precedence over the Mining Act of 1872?*

Response: No, the EIS will not determine precedence. The Agencies must comply with all acts. If this is not possible, a court ruling would probably determine precedence.

4. *What are the Montana landfill laws? Can anything be built on a landfill?*

Response: Montana's Solid Waste Management Act, Title 75, Chapter 10, MCA, regulates the siting and operation of landfills within the state and includes provisions for closure. There are no provisions prohibiting development of facilities of any kind on top of closed landfills.

5. *What is the role of the EIS, the operating plan, and the permit? How do these roles interrelate?*

Response: The Montana Metal Mine Reclamation Act requires the submission of a permit application when a company wishes to develop a mine in the state. Federal regulations require that a proposed plan of operations be submitted to the Forest Service when activities may affect NFS lands. The permit application/proposed plan of operations contains the company's proposed operating reclamation plans and baseline data. These documents provide the basis for the Agencies to evaluate the potential impacts of the proposed project and to determine the adequacy of the application in meeting the minimum standards of the state and federal mining laws, including the respective environmental policy acts.

The EIS process is used to analyze the effect a company's proposal would have on the existing environment; the physical, biological and social resources. The EIS documents the consequences or impacts (beneficial and detrimental) and the level of significance. The decision makers use the draft EIS to select a preferred alternative and the final EIS to make a decision on approving a permit for mining. The public is given opportunities to participate in scoping, which helps develop the issues driving the development of alternatives to the company's proposal and review the draft EIS to evaluate the analyses.

If a permit is approved, the company updates its operating, reclamation and monitoring plans to correspond to the alternative selected by the decision makers in the EIS process. These revised documents become the requirements of the permit that allows the applicant to construct and operate a mine. Deviation from the operating and reclamation plans, unless approved by DSL, is a violation of the Montana Metal Mine Reclamation Act and is followed with a civil penalty.

6. *What happens after the EIS is put together?*

Response: The Forest Service may issue its proposed decision in a Record of Decision along with the final EIS. DSL may make a decision no sooner than 15 days following publication.

7. *Could the mine, mill site, and patented claims be sold after mining is completed?*

Response: Patented claims could be sold. The surface lands above the ore body within the wilderness, mill site, and a portion of the tailings impoundment site are located on NFS lands and would remain government property after mining ceased. Reclamation of all disturbed lands, however, would remain ASARCO's responsibility unless the permit were transferred to another entity or the mine reclaimed to state and federal standards. ASARCO's patented lands outside the wilderness could be sold.

8. *Is there a track record yet with the Hard Rock Mining Impact Act? Has an existing mine made payments under the act?*

Response: Yes; payments have been made to locally affected governmental units by the Stillwater Mining Company, Jardine Joint Venture (now TVX Mineral Hill), and Pegasus Gold Corporation (for the Montana Tunnels mine). Stillwater Mining Company's Impact Plan has had one major revision in 1988 following major amendments to the operating permit since the mine began operations in 1986. Other minor amendments/adjustments have been made to all three plans during implementation.

9. *Is the proposal considered complete yet?*

Response: Yes; ASARCO's application was considered complete by DSL and KNF in November 1989. The Exploration Permit Application was considered complete in July 1993 by both agencies.

10. *How many of the concerns expressed in public meetings and in writing will be ignored? How will they be handled?*

Response: The Agencies have ignored no public comments. Public comments are given responses in this appendix or the reader is referred to other documents, specific EIS sections, laws, or regulations for additional detail or information.

11. *Since this is a joint DSL/Forest Service EIS, what appeal procedure will be used?*

Response: The State of Montana does not have an administrative appeals procedure. State of Montana decisions may be litigated through the state of Montana court system. However, Forest Service decisions are subject to administrative appeal. ASARCO may appeal under 36 CFR 251 subpart C. Other persons and any non-federal organization or entity that have shown an interest in the project, may appeal under 36 CFR 215. ASARCO must file a written Notice of Appeal of the decision with the Appeal Reviewing Forest Officer within 45 days of official notification. Other parties must file a written Notice of Appeal with the Appeals Deciding Officer within 45 days after the date of the notice of the decision is published in the newspaper of record.

12. *If the U.S. Forest Service appeal process occurs, what is the time frame?*

Response: See the response to question 11.

13. *Who pays the costs of the permitting process? If not ASARCO, why not? How can the Forest Service and other public agencies be reimbursed for their costs? What are the costs?*

Response: Under NEPA and 36 CFR 228 regulations, the applicant for a proposed action is not required to conduct an environmental analysis or prepare an EIS. However, the applicant may be required to provide environmental information (baseline data). EISs must be prepared directly by the lead agency or by a contractor selected by the lead agency (ies) and cooperating agencies, if appropriate.

An applicant may be allowed to finance the cost of a contractor selected to prepare an EIS. Such arrangements must be documented by a cooperative agreement or memorandum of understanding. For instance, after the Forest Service has assessed the project proposal and has determined needed expertise and time frames, the applicant may want to speed up the process. The applicant may then be asked to finance part or all of the processes associated with completing an EIS.

MEPA authorizes DSL to collect fees from the applicant for preparation of an EIS. The cost of an EIS ranges between $300,000 - $1,500,000, depending upon project complexity. Other costs associated with permit review are borne by the Agencies and paid with state and/or federal tax dollars.

14. *Who, and at what cost, would enforce the terms of the EIS?*

Response: The EIS is not an enforcement document. The EIS discloses the potential impacts of the proposal and evaluated reasonable alternatives. The only enforceable elements of an operating permit are the operating and reclamation plans approved by the Agencies, and the conditions of approval. DSL would inspect the mining operations and issue notices of violations when conditions of the approved permit are not being met. KNF may issue Notices of Non-Compliance if ASARCO does not meet conditions of the approved plan of operation or does not comply with Forest Service regulations (36 CFR 228 Subpart A). KNF may take appropriate enforcement action if ASARCO does not come into compliance. Other agencies may also issue notices of violation and fine ASARCO for noncompliance with associated permits.

15. *Does ASARCO have plans to improve relations with the Noxon community? Might these plans include ASARCO contributions to construct recreational facilities?*

Response: It is unknown whether ASARCO has such plans. The description of the Montana Hard Rock Mining Impact Act in Chapter 1 discusses economic mitigation for communities, including construction of community facilities.

16. *Will the EIS play a role in insuring satisfactory wages and labor practices and adequate working conditions?*

Response: No, that is beyond the scope of this EIS. Issues pertaining to satisfactory wages should be resolved between the company and the workers. Concerns about labor practices and adequate working conditions should be directed to OSHA and MSHA. See also Worker Safety question 1.

17. *How can it be assured that the law is used not to stop development of the mine but to make it as safe as possible?*

Response: The intent of state and federal mining laws and environmental policy acts are not to "stop development." These laws provide the standard by which mining may operate in a manner that will not unreasonably threaten environmental resources.

18. *When environmental concerns are incorporated into the plan of operations, is the mine still economically feasible?*

Response: Best management practices and other measures to reduce or prevent environmental damages that ASARCO would implement are summarized in Chapter 2, Alternatives Descriptions. All mitigating measures and reasonable alternatives identified in this EIS are believed to be economically feasible.

19. *What is the optimum time frame for development in terms of socioeconomic and environmental impacts? For example, should development be delayed until closure of the Troy project? Would a longer-running project with lower production have less impact? Will alternative timeframes and rates of development be considered?*

Response: An EIS is written to identify probable environmental impacts and to minimize and mitigate unfavorable impacts. An EIS is not a corporate planning document and does not attempt to control development and production timeframes. No alternative rates of development are being considered.

20. *Would there be a policy to hire the handicapped at the mine?*

Response: It is unknown what ASARCO's policy would be on hiring the handicapped. However, the company has stated it would provide extensive training for employees. Presumably, if a handicapped person has the necessary job qualifications, he/she would be hired and trained.

21. *What is the present net value (discounted costs and benefits over a 100-year period) for silver plus environmental degradation now, vs. silver plus environmental degradation later?*

Response: A benefit-cost analysis is not required by MEPA or NEPA. Since this project does not involve the investment of public funds and since the company would be required to mitigate environmental impacts, a net present value analysis is not appropriate. Presumably the company has analyzed the costs and revenues associated with development of Rock Creek and found the project to be profitable. Reclamation and environmental mitigations should be adequate to offset or correct adverse environmental impacts; therefore, a benefit-cost analysis would not be necessary.

22. *Can we expect that ASARCO would meet air and water quality standards at the Rock Creek Mine when they have not done so at their East Helena plant?*

Response: ASARCO must meet air and water quality standards at the proposed Rock Creek Mine, or otherwise violate various regulatory laws with stiff civil penalties and administrative powers. It is not in ASARCO's best interest to violate these laws.

23. *How can a private citizen make concerns known to the Hard Rock Mining Impact Board?*

Response: See Chapter 1, Agency Roles and Responsibilities (Hard Rock Mining Impact Board/Sanders County). Private citizens can contact the local governing body, Sanders County, for concerns about the proposed or approved impact plan. If citizens are concerned about how the governing body is implementing the law, then they should contact the Hard Rock Mining Impact Board at the Montana Department of Commerce in Helena, Montana.

24. *What is the private citizen's role in the impact plan vs. local government's role?*

Response: See above response and Chapter 1, Agency Roles and Responsibilities (Hard Rock Mining Impact Board/Sanders County). Private citizens may work with the governing body when a plan is being developed or attend a public hearing during the formal 90-day review period after a company submits its plan.

25. *Who would monitor environmental changes and how would they be reported?*

Response: Environmental monitoring would be done by both ASARCO and the Agencies. ASARCO's environmental monitoring programs, including field and laboratory procedures, would be approved by the Agencies. Results of ASARCO's monitoring would be routinely submitted to the Agencies. The Agencies would also routinely inspect and monitor the mine. Agency inspection reports are public documents and would be on file with the Forest Service in Libby and Trout Creek and with DSL in Helena. Also see **Appendix H**.

26. *Is there a disaster contingency plan? Who would pay in the event of a disaster?*

Response: Sections 26.4.160 and 163, ARM, require operating plans for mills to include a description of a toxic spill contingency plan. Requirements for the plan are specified in the Hazardous Materials Management Plan Instructions in the 1991 Uniform Fire Code which is available from the State Fire Marshall. Information regarding storage, containment and spill cleanup procedures is contained in ASARCO's Operating Permit Application. That information will be updated in the permit after the ROD has been issued for this project.

ASARCO would be responsible for any costs associated with a disaster or a spill or release of a hazardous or toxic material.

If an environmental emergency occurred, DSL could apply for funds from the environmental contingency account to abate the situation on either a temporary or permanent basis. DSL also has the rights to bring an action against ASARCO to recover abatement costs (82-4-357 MCA). These costs are separate from any performance or reclamation bonds held by DSL.

27. *Is there sufficient room for both the ASARCO and the Noranda mines on the Noxon side?*

Response: Noranda's Montanore mine has already been approved and will be located on the Libby side of the Cabinet Mountains Wilderness. If a joint venture were to be conducted, it would most likely occur there rather than on the Noxon side. See Chapter 2, Alternatives Considered but Dismissed From Further Study.

28. *What would the cumulative impacts of the two mines be?*

Response: Cumulative impacts discussions at the end of each resource impact section in Chapter 4.

29. *Why don't the Agencies consider a joint venture, with one mine and facilities, between ASARCO and Borax (Noranda) on the EIS?*

Response: The state and federal environmental policy acts require that the Agencies evaluate all reasonable alternatives, whether or not they are within the jurisdiction of the Agencies. A joint venture may be an environmentally reasonable alternative, however, it requires that Noranda and ASARCO work out complex company policies and agreements. Both companies have stated that they are not interested in a joint operation. Neither agency has the authority to force two companies to work together to consolidate their mining operations. Therefore, a joint venture between the companies is not likely. A joint venture alternative is described in Chapter 2, Alternatives Considered but Dismissed From Further Study.

30. *If the ASARCO Rock Creek Mine were permitted, would it be harder to stop additional proposals, that is, a Noranda mine?*

Response: Noranda's Montanore Mine was permitted by DSL and KNF in 1993 and the company has either applied for and/or received all other necessary permits. The existence of a major mine operating adjacent to the Cabinet Mountains Wilderness would not politically influence the Agencies' decision-making process. The EIS process requires that cumulative impacts with other reasonably foreseeable activities be assessed in addition to those impacts associated just with a proposed project. Cumulative impacts discussions at the end of each resource impact section in Chapter 4.

31. *What would be the effect of opening two large silver mines on the supply/demand situation for silver and on the economic feasibility of the Rock Creek project?*

Response: The silver market is a world-wide market. Although silver production in Montana would increase noticeably with the opening of the proposed Rock Creek Mine and Noranda's Montanore Project, such production is not expected to affect world prices or supply at the margin. Therefore, the economic feasibility of the Rock Creek project should not be impacted by the Noranda mine.

32. *How much gold is in the Rock Creek Mine area, and who pays taxes on it?*

Response: In the immediate area of the project, there is one gold property--the inactive Heidelberg Mine near Rock Lake. Other inactive gold properties are located along the east side of the Cabinets in the Libby Creek and West Fisher areas.

The amount of gold reserves in these properties is not a matter of public record and is unavailable. The State of Montana and the federal government do not tax minerals in place. State taxes are based on the value of production; the federal government taxes income from the sale of minerals (see Chapter 4, Socioeconomics).

33. *Can tailings be used for something other than long-term storage (e.g., landfill cover, reclaiming old pits)?*

Response: It is not economically feasible to ship tailings anywhere for alternate use. The tailings, if not potentially acid-producing, could be used to fill old pits or cap landfills, but the cost of shipping is prohibitive. Alternate means of disposal are described in Chapter 2, Alternatives Considered but Dismissed From Further Study, and **Appendix E**.

34. *Will the outside emissions of concentrate drying be allowed at Rock Creek?*

Response: ASARCO is not proposing to dry concentrate outside. Concentrates would be dewatered in two thickeners prior to loading into trucks for transport to the rail siding. See Chapter 2, Alternatives Descriptions.

35. *The current tailings impoundment designs would need a permit which would include requirements not found in discharges permitted under the Metal Mine Reclamation Act. A critical requirement under the MPDES system is the expiration of permits every 5 years.*

Response: See Chapter 1, Agency Roles and Responsibilities.

36. *I have observed at the end of the 1986 drilling season that the helicopter lift area at the 5-mile marker of Rock Creek Road was left in a less than environmentally sound state. There was a considerable amount of oil spill in the puddles of standing water flowing into Rock Creek, and a form of jell lubricant left laying on the ground. What is ASARCO planning to do to alleviate this problem and what kind of assurances do we have that this problem will not arise again?*

Response: ASARCO is required under the Comprehensive Environmental Response, Compensation, and Liability ACT (CERCLA), 42 U.S.C. 9605, and the Clean Water Act (CWA) to contain, report, and clean up discharges of oils and releases of hazardous substances, pollutants, and contaminants which might reach surface and ground water resources. DHES has the authority to enforce compliance with the CWA (see Montana Water Quality Act) and issue notices of violation and fines for noncompliance. See Chapter 1, Agency Roles and Responsibilities.

37. *ASARCO must define the term hazardous material, identify what hazardous materials will be used, and specify how and where disposal will take place.*

Response: It is not ASARCO's responsibility to define the term "hazardous". It is already defined in several federal regulations and referenced in applicable state regulations. See 40 CFR 300.5, 42 U.S.C. Section 9601(14), and ARM 16.20.924.

ASARCO would be using several toxic reagents in the milling process. The areas where these materials are stored would be contained with no drains to the exterior. Spilled material would be either used or stored in waste drums and properly disposed. See the Operating Permit Application, Volume 2, for more detail. The diesel fuel and gasoline storage tanks would be placed within containment berms which will hold one and one-half times the volume of the tank.

38. *Who will respond to hazardous spills? Medical emergencies? Who will staff, pay for and support the haz-mat response crew and the EMS crew? Will there be a haz-mat response crew stationed locally?*

Response: ASARCO has indicated that there will be trained haz-mat and emergency medical response personnel at the mine. Haz-mat response would be coordinated with the Sanders County emergency disaster coordinator and the Sheriff's Department. Local hospital and fire department ambulance crews would be called to respond to medical emergencies. ASARCO would ultimately be responsible for costs associated with both types of response. See also response for question 26, above.

39. *A "worst-case scenario" should certainly be considered in this case, because of many and varied past, present, and foreseeable activities in Northwest Montana. At least one alternative should be offered with the result that development on public lands must be curtailed in order to protect the environment and wildlife. At least one alternative should be presented whereby open space can be preserved rather than subdivided. At least one alternative should offer reforestation and its potentially moistening effect on a region now in the grip of drought and all that drought can mean for wild species.*

Response: Alternatives are developed to address significant issues identified during the scoping process. The EIS must also assess the no-action alternative as well as the proposed action. The Agencies have developed two alternatives which address the significant issues (see Chapter 2, Alternatives Descriptions). The no-action alternative would curtail this mining operation on public land by denying the permit. The division or development of open spaces is not an issue pertinent to this project and was not assessed. ASARCO does propose to plant trees and shrubs in portions of the reclaimed land (see Chapter 2, Project Description) and the action alternatives expand upon ASARCO's plan.

40. *Be extremely detailed in exactly what and where the project area is considered to be for all resources mentioned in the scoping notice.*

Response: The survey area and/or area of impact for the resources mentioned in the scoping survey is generally considered to be the permit area. For some resources, however, the areas extend beyond the boundary. The extent of the survey areas and/or areas of impact are defined in Chapter 3, Introduction.

41. *The EIS should include a no-discharge alternative. That is, there should be analysis on an alternative that ensures no pollutants are discharged from the adits, mill or tailings impoundment.*

Response: Neither MEPA nor NEPA require no-discharge alternatives. Unless ASARCO obtains a variance from the nondegradation rules, they would not be allowed to discharge pollutants in greater concentrations than in the receiving streams. The specific standards and methods for achieving this should be stated in the MPDES permit ASARCO has to obtain from DHES. See Chapter 1, Agency Roles and Responsibilities.

42. *What would constitute an adverse taking? Would time delays, onerous permit restrictions or flat permit denial be a taking of mining rights?*

Response: A taking is an appropriation of private property for public use. The Fifth Amendment to the United States Constitution and Article II, Section 29, of the Montana Constitution provide that a taking may not occur without payment of just compensation to the owner of the property. In most instances, a taking occurs through a physical invasion of the private property. However, a taking can occur when an owner is deprived of all economically viable uses of the property through regulatory restrictions. The law in this area is based on court opinions. Because the law is evolving and because takings opinions are heavily dependent on the circumstances involved in each particular case, it is not possible to give hard and fast rules regarding time delays, permit restrictions, and permit denial. However, a court could hold that a permit denial or permit restrictions deprive the owner of all economically viable uses of the property and, therefore, constitute a taking. It is unlikely that time delays in processing a permit application would be held to constitute a taking.

## WETLANDS

1. *Assurances that will guarantee there will be no overall net loss of wetlands habitats should be included in the mitigation plans.*

Response. ASARCO's proposed wetland mitigation plan has been submitted to the U.S. Army Corps of Engineers (COE) in compliance with Section 404(b)(1) of the Clean Water Act. ASARCO's wetland mitigation plan proposes "no net loss" of wetland by providing appropriate mitigation and compensation of the unavoidable loss and potential diminishment of wetland values associated with development of the ASARCO Rock Creek Project. Specific wetland mitigation acreage ratios have not been established by the COE. The Agencies' evaluation of the wetland mitigation plan for the preferred alternative is in **Appendix C**. The COE will then make a determination as to whether or not the preferred alternative is the most practicable, least environmentally damaging alternative. They would also make a determination as to the effectiveness of the mitigation plan and specify what changes would be needed.

## APPENDIX E - TAILINGS AND SUBSIDENCE

### INTRODUCTION

This appendix contains discussion on three geotechnical topics: tailings disposal alternatives, impoundment setting options, and impoundment construction alternatives. These topics are followed by a description of the impoundment alternatives which are discussed in the EIS. Discussion on a geology-related topic, subsidence, is also provided.

### TAILINGS DISPOSAL ALTERNATIVES FOR THE ASARCO ROCK CREEK PROJECT

The development of potential alternative tailings disposal options began very early in the planning phase for the proposed project. The process investigated a wide range of possible options. The options included three general categories of tailings disposal alternatives:

- Technological Alternatives - Consideration of various tailings disposal technologies,
- Setting Alternatives - Consideration of different locations for disposal of tailings in an impoundment, and
- Construction Alternatives - Consideration of different types of tailings impoundment construction.

### TECHNOLOGICAL ALTERNATIVES

ASARCO proposes to dispose of the tailings from the mill in an impoundment constructed with slurry-deposited tailings. This is the typical method for tailings containment for base metal mining ventures at the scale of the proposed project. The Agencies reviewed the potential for other tailings disposal technologies to reduce size or other potential impacts related to the proposed impoundment because the project involves the disposal of approximately 100 million tons of tailings requiring an impoundment structure about 325-feet high and covering 324 acres. The potential alternative tailings disposal technologies reviewed were:

- Tailings Disposal in the Underground Mine - Placement of tailings in the underground openings created by mining in order to eliminate or greatly reduce the size of the surface impoundment.
- Disposal of Dewatered Tailings - Use of tailings dewatering technology to avoid the slurry deposition of tailings and its attendant issues of seepage water quality and stability of saturated tailings.

**Tailings Disposal in the Underground Mine**

The placement of tailings in underground mine openings is common practice in the base metal mining industry, but its primary purpose is to provide physical support of the underground openings to allow continued mining rather than to provide tailings disposal.

Historically, tailings backfill has been practiced in underground mines that follow narrow, vertically oriented, mineral veins unlike the thick, horizontally lying, ore zones of the proposed project. The first method developed for this involved separating the sand fraction of the tailings (sand) from the silt and clay sized portion of the material (slimes). The sand was pumped in a water slurry to the underground mine openings (stopes) where its sandy character allowed the water to drain away and the sand to settle into a compact mass in the stope. This sand-fill both supported the walls of the stope and provided a working floor for the miners to proceed with extraction of the vertically oriented ore vein.

A further development of the sand-fill technology was the addition of cementing agents, usually portland cement, to the sand-fill to create a weak concrete. This resulted in a stronger backfill material and allowed for the mining of narrow vertical stopes surrounded by very weak rock. This method of cemented sand-fill also found use in the mining of horizontal ore zones, similar to those of the proposed project, where initial support of the stope roof (back) was supplied by leaving wide pillars of ore to hold up the back. Filling the open stopes with cemented sand-fill allowed subsequent recovery of the ore pillars with the cemented sand-fill providing back support. For economic reasons, this method of recovering additional ore is generally limited to very high value ore.

The obvious question is: does this sand-fill technology afford an alternative tailings disposal method that can eliminate or significantly reduce the impacts of the proposed tailings impoundment? As discussed above, the method of sand-filling uses the sand fraction of the tailings; the slimes portion is unused and requires some form of disposal. In a modern base metal mill, this slimes fraction typically makes up 50 - 80 percent of the total tailings material. ASARCO projects that approximately 60 percent of the tailings will be slimes (Dames & Moore 1993). Therefore, if sand-filling is used, only about 40 percent of the tailings can go back into the underground openings as a part of the mining procedure; the remaining 60 percent of tailings slimes must be disposed of in another way.

Disposal of slimes in a surface impoundment would require construction of a retention dam to safely contain the fine-grained slimes. The overall size of the retention dam and the retained slimes would not be significantly less than that of the proposed tailings impoundment and the material for the dam would need to be mined from some source near to the disposal site. Therefore, use of this method would result in no real reduction in the size of the surface tailings impoundment and add a very large additional surface disturbance to supply construction material for a slimes retention dam.

To assess the potential size of the mine needed to supply dam construction material for this option, it is reasonable to assume that the amount of dam construction material is roughly equal to the sand fraction of the tailings. This is approximately 40 percent of the 100 million tons of overall tailings, or 40 million tons of additional excavation. Conservatively assuming 2 tons/cubic yard for this material results in the retention dam needing 20 million cubic yards of additional material to be mined from a location near the impoundment. For a sense of scale, this amount of material would require a vertically sided hole, 100-feet deep, covering about 120 acres. In the opinion of the Agencies, this is not a viable alternative for tailings disposal.

Disposal of the separate slimes fraction in the underground mine would require creation of additional space by removal of the ore pillars and use of substantial bulkheads constructed to contain the slimes in the stopes between the cemented sand-fill pillars. Based on discussion with specialists from the U.S. Bureau of Mines, this possible method of tailings disposal is not practiced in the mining industry, is not a proven technology, and is not likely to be economically viable as a tailings disposal method (Lani Boldt, U.S. Bureau of Mines, personal communication, June 5, 1993). In addition, since the proposed mine does not economically require back support beyond the use of ordinary pillars, use of this unproven method would require the applicant to undertake extensive and costly construction of underground structures that are unnecessary for the proposed mining method. In the opinion of the Agencies, this is not a viable alternative for tailings disposal.

The problems with sand-fill as a potential tailings disposal alternative involve the need to dispose of the slimes fraction separate from the sand. Ongoing research in the use of the whole tailings for backfill is now beginning to move into industrial-scale applications. However, to date, such applications of whole tailings backfill at the scale of the proposed project are limited to those requiring cemented backfill for underground support and are integral to the economics of the mining method necessary for recovery of the ore (L. Boldt, pers. comm., June 5, 1993; Jim Vickery, Kennecott Copper Company, personal communication, June 5, 1993). This is not the case for the proposed project and this technology is not proven as an economic tailings disposal method.

In addition, due to the increase in volume resulting from grinding the ore, it is not possible to return all the tailings to the underground openings from which it was mined. Therefore, even if this method were used, most of the tailings would need to be placed in a surface impoundment because it simply would not fit in the underground openings created by mining.

Due to the practical mining considerations, not all of the underground space could be used for placement of cemented whole tailings. Perhaps as much as one-half of the tailings could be placed in the mine openings. Based on the height-capacity information in the preliminary designs (Dames & Moore 1993), reducing the tailings in the surface impoundment by one-half would result in reducing the height of the impoundment by 132 feet under Alternative II and by 137 feet under alternatives III and IV.

Lowering the impoundment may provide some slight increase in stability. If such a small increase is required during the final design phase, it will be obtained through design changes other than mandating reduced tailings volume through underground disposal.

In addition, the practicabilities of tailings disposal design generally do not allow reducing the area of an impoundment by the same percentage as a potential height reduction, if the original height is retained. Therefore, if the optimistic estimate of one-half the tailings were placed underground, the overall area disturbed for the surface impoundment would likely be reduced by only 20 acres.

Cemented whole-tailings backfill is still an experimental technology. Even if it were a proven industrial process it would be very expensive and an unrealistic method of tailings disposal. The cost of conventional tailings disposal in a surface impoundment typically is $0.80 to $2.50 per ton as compared to $3.00 to $12.00 per ton for cemented-sand backfill. The use of cemented backfill is not a viable option for tailings disposal.

### Disposal of Dewatered Tailings

The use of dewatering methods to reduce the water content of slurried tailings and place the dewatered tailings as a moist soil rather than a hydraulically placed slurry is practiced at some mining operations. This technology has emerged over the last decade and is used in the metal mining industry primarily in the disposal of tailings from smaller operations in precious metal mining (i.e, gold and silver, rather than the larger base metal mines).

The dewatering of tailings is done with various types of filters that are used to squeeze, vacuum, or apply both processes to extract water from slurried tailings and create a moist tailings material. This moist tailings is then mechanically placed using conventional earthmoving methods (i.e., trucks, conveyors, stackers, bulldozers, etc.) to construct an earthen fill from the tailings. Such a fill may, depending on specific engineering properties of the tailings and the disposal location, be retained behind a dam, self-supporting, or a combination of the two.

To date, the existing filtration methods have proven industrial and economic applications to handle on the order of hundreds of tons of tailings per day. The proposed project would process approximately 10,000 tons per day of tailings. Tailings dewatering technology is not a proven industrial process for the throughput required by the proposed project, and, although it may provide an applicable method in the future, the Agencies do not consider it to be a viable tailings disposal alternative at this time.

### Summary of Technological Alternatives

The general suite of potential tailings disposal technological options were reviewed for detailed analysis as alternatives. Based on this review, no alternative tailings disposal technologies are considered appropriate for detailed impact analysis.

## IMPOUNDMENT SITING ALTERNATIVES

Potential siting options were reviewed in detail by the Agencies. The first review considered potential tailings disposal sites in conjunction with several potential locations for the mill facility. Because the tailings must be transported from the mill to the disposal facility there are several location requirements that are controlled by the proposed mill site: 1) tailings sites should be located relatively near to the proposed mill, 2) typically they should be at an elevation lower than the mill to provide gravity-assisted flow of a tailings slurry, and 3) there should be a relatively unobstructed transportation corridor between the tailings and mill sites.

In 1986, the Forest Service published a report detailing the findings of a general tailings and mill facility setting study conducted for the Cabinet Mountains. This study, known as the MAC Report (USFS 1986), predated this EIS process and included an evaluation of various potential tailings and mill facility locations for the then-conceptual proposed ASARCO Rock Creek Project and U.S. Borax (Noranda's now-permitted) Montanore Mine. The MAC Report identified seven potential mill sites, for the Rock Creek Project: two sites on the East Fork Bull River, one site on Copper Creek, and four sites in the Rock Creek drainage. Based on these seven potential mill sites a survey was conducted to identify potential sites for tailings disposal impoundments. The following criteria were applied to identify potential tailings impoundment locations:

- Tailings location should be less than 10 miles from the mill site;
- Tailings location should be at a lower elevation than the mill site;
- Tailings location should have relatively gentle terrain (less than 10 percent slopes);
- Tailings location should have foundation conditions that could be reasonably expected to support an impoundment facility; and
- Use of the tailings location would not require diversion of a major stream.

Based on these criteria, the three potential mill sites inclusive of the East Fork Bull River and Copper Creek locations have three alternative tailings locations in common. All these potential tailings sites are adjacent to the Bull River either within its valley (one site) or at its confluence with the Clark Fork River (two sites). For the four potential mill sites in Rock Creek, the MAC Report identified four common potential tailings disposal sites. All four of these alternative tailings sites are adjacent to the Clark Fork River with three sites located at the confluence of Rock Creek and the Clark Fork and one site located approximately 5 miles south of Rock Creek at the mouth of Swamp Creek.

As project definition proceeded the possible locations for the mill were reduced to sites in the Rock Creek drainage, thereby eliminating those tailings alternatives that were associated with the East Fork Bull River and Copper Creek mill locations. As a result, the Mac Report identified four alternative tailings sites for the proposed project with its mill located in the Rock Creek drainage.

The four potential tailings impoundment sited identified in the Report are:

- Site 11A - A location immediately north of Rock Creek at its confluence with the Clark Fork River. This is the site selected by ASARCO for the proposed tailings impoundment.
- Site 12 - A location near to Site 11A but located immediately south of Rock Creek. This site does not have adequate capacity to contain the life-of-mine tailings production and was not carried forward for further evaluation.

- Site 10 - A general location across the Clark Fork River from the mouth of Rock Creek. Using this site would require crossing the river with both tailings and reclaim water pipelines.

- Site 21 - A location immediately south of the mouth of Swamp Creek approximately 5 miles south of Site 11A.

During the EIS process, the Agencies expanded the review of potential tailings impoundments and developed an internal working document that combined both setting and construction method options. This document (Thompson 1989), evaluated the three candidate sites from the MAC Report for both upstream and downstream construction. It concluded that none of the three sites were reasonably suited to the downstream method of construction. It also concluded that, although all were probably suitable for upstream construction, none had sufficient environmental advantages over the proposed location to warrant their further assessment.

Therefore, of the potential tailings locations identified in the MAC Report, only the proposed site, north of Rock Creek, was evaluated as an alternative in the EIS (alternatives II, III, and IV). The subsequent document (Thompson 1989), however, did propose a location at McKay Creek that appeared to offer the potential for construction of a downstream tailings impoundment. The potential to directly mitigate the design issue of seismic liquefaction resistance by using the downstream construction method and the potential to reduce the visual impact of the impoundment resulted in McKay Creek being evaluated as an alternative in the EIS (Alternative V). This was done in spite of the fact that McKay Creek was not deemed suitable in the MAC Report because its use would have required diversion of a major stream.

### Summary of Siting Alternatives

The Agencies reviewed many potential tailings sites for the Rock Creek Project. The review is summarized in **Table E-1**. Based on this review process, two tailings setting alternatives were developed for detailed impact analysis. These alternative sites are located at Rock and McKay creeks.

The third-party engineering review of the proposed tailings site at Rock Creek determined that, based on the present level of knowledge, the site is suitable for construction of a tailings impoundment of the capacity proposed by ASARCO (Chen-Northern 1990; Klohn Leonoff 1991; Klohn Leonoff 1992). The McKay Creek site was developed by the Agencies as a conceptual design and has not been subjected to a site-specific engineering analysis.

## IMPOUNDMENT CONSTRUCTION ALTERNATIVES

Potential construction alternatives for a tailings impoundment at the Rock Creek site have received extensive review throughout the Agencies evaluation of the application. The McKay Creek site is a conceptual location for a downstream structure and has not been reviewed for other construction options.

## TABLE E-1.
## TAILINGS IMPOUNDMENT SITING ALTERNATIVE SUMMARY

| Site | Construction Option | Reason Dismissed from Further Consideration | Reference |
|---|---|---|---|
| Rock Creek (MAC Report Site 12) | Not Applicable | Insufficient capacity | MAC Report (USFS 1986) |
| Rock Creek (MAC Report Site 11A, ASARCO proposed site) | Downstream Method | Excessive amount of borrow required (40 million cubic yards). | Thompson 1989 |
| Noxon Bench (MAC Report Site 10) | Upstream Method | Tailings & reclaim water pipelines crossing the Clark Fork River. | Thompson 1989 |
| Noxon Bench (MAC Report Site 10) | Downstream Method | Tailings & reclaim water pipelines crossing the Clark Fork River. Excessive amount of borrow required (35 million cubic yards). | Thompson 1989 |
| Swamp Creek (MAC Report Site 21) | Upstream Method | Tailings & reclaim water pipelines twice as long as needed for the Rock Creek site. Disturbance area 200 acres larger than for the Rock Creek site. Site is privately owned and would require removal of residences. No distinct advantages over the Rock Creek Site. | Thompson 1989 |
| Swamp Creek (MAC Report Site 21) | Downstream Method | Same as upstream. Excessive amount of borrow required (10 million cubic yards). | Thompson 1989 |
| Swamp Creek/Rock Creek Combined Site | Downstream Method | Same as for Swamp Creek. Total disturbance area of approximately 700 acres. | Thompson 1989 |
| Noxon Bench/Rock Creek | Downstream Method | Same as for Noxon Bench. Total disturbance area of approximately 700 acres. | Thompson 1989 |
| McKay Creek | Downstream Method | Greater impact to Waters of U.S. and wetlands and diversion of a perennial stream. | Thompson 1989 |

All the construction alternatives use slurry transportation and deposition of tailings within an impoundment as the method of permanent disposal of the tailings. Typically, there are two general types of retention dams used to contain mill tailings:

1) an earthen embankment constructed entirely with material other than tailings; and

2) An embankment consisting of some mixture of tailings and other earthen materials.

The first general type of retention embankment is essentially similar to the type of dam used to impound a water reservoir and is typically used when the tailings require complete hydraulic isolation from the surrounding environment and/or the total amount of tailings is rather small. This kind of embankment is constructed prior to deposition of tailings and is built entirely with nontailings material. Due to the amount of tailings requiring disposal, this construction method is not considered to be a viable alternative.

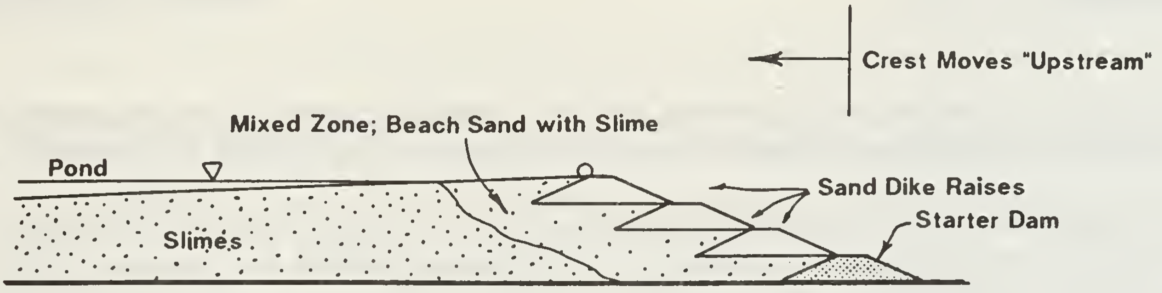
The second general type of tailings retention embankment is constructed using the sand fraction of the tailings as a portion of the embankment construction material. The general construction sequence for this kind of tailings impoundment involves the construction of starter dams with nontailings material; much like the water reservoir type of dam discussed above. However, unlike the water reservoir type, the starter dams serve only to provide the beginning of the tailings embankment structure and are typically much smaller in both height and lateral extent than the final tailings impoundment.

Using the starter dams as a beginning, tailings are slurried to the top of the dams where they are hydraulically deposited both on and upstream of the starter dams. During this hydraulic deposition, the sand fraction of the tailings is kept at the outside of the tailings impoundment and the finer slimes fraction is placed within the interior of the impoundment. As the amount of tailings placed in the impoundment increases over time and the height of the facility increases the tailings themselves become a primary component of the retention dam. In essence, the sand fraction of the tailings is used to construct the embankment to contain the slimes. In addition, it also contains the water from the slurry and any rain, snow, or undiverted runoff and maintains a reservoir of water for recycling to the mill.

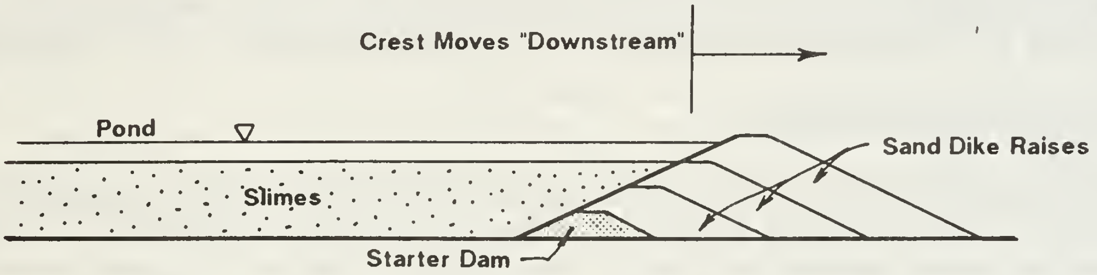
This second general type of tailings retention structure is sequentially raised with stages of embankment construction rather than completely constructed prior to tailings deposition, therefore it is referred to as a staged embankment. There are three basic categories of staged embankments. They are named according to the horizontal direction the crest of the dam moves during its construction lifetime, they are: (1) upstream, (2) downstream, and (3) centerline (**Figure E-1**(a-c)). In addition, it is possible to combine methods to produce a hybrid construction method. One such method, modified centerline construction, is an alternative for this project (**Figure E-1**(d)).

As can be seen from careful inspection of **Figure E-1**, the upstream style of staged embankment construction requires the least amount of "sand" for the "dike raises" used to construct the embankment. Typically, there is always enough sand in the tailings themselves to provide the required amount of embankment construction material, therefore upstream construction requires no additional dam building material other than that needed for the starter dams.

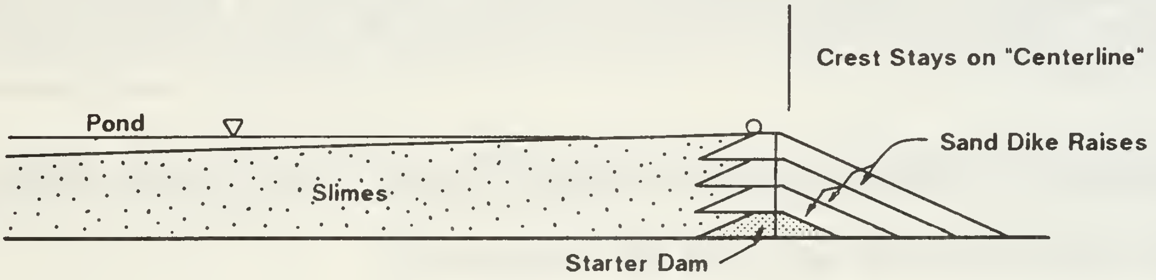
Further inspection of **Figure E-1** reveals that the downstream style of embankment requires the most "sand" and that the centerline method uses an amount of "sand" intermediate between the upstream and downstream methods. Typically, the tailings do not provide enough "sand" to construct the "dike raises" needed for a downstream embankment and a substantial quantity of additional, nontailings fill material is needed to construct a downstream dam. The centerline method, using an intermediate amount of "sand", may or may not have its "sand" requirements met by the available tailings. In the case of a



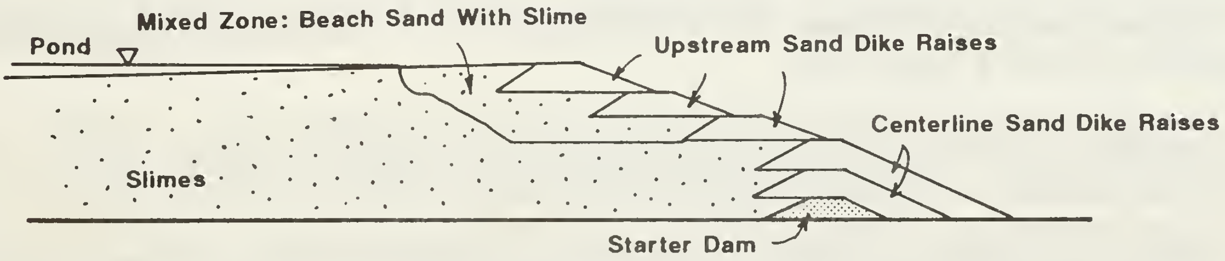
(a) Upstream Construction (Alternative II)



(b) Downstream Construction (McKay Creek)



(c) Centerline Construction


Mixed Zone: Beach Sand With Slime
Pond
Upstream Sand Dike Raises
Centerline Sand Dike Raises
Slimes
Starter Dam

(d) Modified Centerline Construction
(Alternatives III and IV)

FIGURE E-1
Impoundment Construction Methods
Rock Creek Project

centerline dam, it is typical to avoid continuing addition of nontailings material over the construction life by increasing the size of the starter dam(s) to make up the amount during initial site preparation.

A second set of fundamental differences among the three types of staged embankments is the positioning of the "sand" relative to the "slimes". As can be seen on **Figure E-1**, the upstream movement of the crest in the upstream embankment places the top of the dam over previously deposited mixed sand and slime in the beach and the slimes beneath the pond. In essence, this includes these materials as a major part of the structural support for the retention embankment. However, the downstream movement of the crest of a downstream dam continually oversteps "sand" and the "slimes" are not included in the structural mass of the embankment. The centerline method of construction is intermediate between these two and may or may not rely on the beach materials to provide structural support for the impoundment.

### Summary of Construction Alternatives

ASARCO has submitted two preliminary designs for construction of a tailings impoundment at the Rock Creek site. These preliminary designs, for an upstream embankment (Alternative II) and for a modified centerline structure (alternatives III and IV) were originally submitted as separate documents, but at the Agencies' request, are available in a single reference volume (Dames & Moore 1993).

In addition, the Agencies developed the McKay Creek site as a conceptual downstream embankment. This conceptual alternative does not have a preliminary design to the same level as those at the Rock Creek site.

## DESCRIPTION OF ALTERNATIVE IMPOUNDMENT DESIGNS EVALUATED IN THE EIS

### Upstream Construction at the Rock Creek Site (Alternative II)

Alternative II is the originally proposed action of an upstream style staged embankment at the Rock Creek site (Dames & Moore 1993). Features of this tailings disposal alternative, including items from both the design and Agency review, are presented below.

***Upstream Staged Embankment.*** The tailings impoundment is raised using the upstream method of construction (Dames & Moore 1993).

***Location.*** The tailings disposal facility located at a single site near the confluence of Rock Creek and the Clark Fork River. The site covers approximately 324 acres (Dames & Moore 1993).

***Disposal Technology***. The tailings disposal facility is an impoundment built with slurry deposited tailings initially placed behind starter dams constructed of local soil and/or rock (Dames & Moore 1993). Through time, the height of the deposited tailings exceeds that of the starter dams and the tailings are a self-supporting structure.

***Embankment Stability Issues.*** There are four primary issues that the tailings facility design must account for in order to demonstrate an acceptable level of stability: (1) adequate protection from overtopping and washout by a very large storm event, (2) accounting for the low strength of the soft clay zones known to exist in the embankment's foundation, (3) providing an adequate assessment of the tailings resistance to liquefaction during earthquake events, and (4) providing sufficient drainage within the embankment to control the water level within the tailings retention embankment. These issues are discussed in the following sections.

***Storm Water Control.*** The tailings facility has two storm water control design elements: 1) diversion structures to route storm runoff from outside of the immediate impoundment area around the tailings facility, and 2) containment within the impoundment of storm water that falls directly in the tailings facility. The diversion structures are designed to pass the calculated probable maximum flood (PMF) (Dames & Moore 1993). The impoundment would also contain the PMF during its operational life, however, due to its construction sequencing, it cannot reach this goal without encroachment on the 200 foot minimum beach width (Dames & Moore 1993) until about year 3 of its life (Chen-Northern 1990).

***Tailings Water Reclaim System.*** The tailings facility would have a tailings water reclaim system to recycle water from the tailings impoundment to the mill for continued mineral processing. The system will consist of a pumping station within the tailings impoundment and a pipeline to the mill. The reclaim pipeline would parallel the tailings slurry pipeline transporting tailings from the mill to the tailings impoundment (Dames & Moore 1993).

***Tailings Embankment Seepage Collection/Return System.*** The embankment of the tailings impoundment will seep water from inside the impoundment. This embankment seepage will be collected at the toe of the embankment and returned to the impoundment via a pumping system (Dames & Moore 1993).

***Material Segregation and Placement.*** Two methods of material segregation (separating the sand fraction from the slimes) and placement (depositing the materials in the impoundment) are proposed with the final selection of method postponed until the final design phase. The proposed methods are: 1) spigot discharge and hydraulic segregation, and 2) single-stage cyclone separation with separate discharges (Dames & Moore 1993).

Method 1, spigot discharge with hydraulic separation, discharges the entire tailings slurry from nozzles (spigots) located on the crest of the dam onto the upstream face of the impoundment. As the velocity of the discharging slurry decreases away from the spigots the larger sand particles begin to settle out from the slurry. As the slurry gets farther from the spigots, it deposits progressively finer and finer particles, resulting in the hydraulic segregation of sand near to the crest of the embankment progressive grading to slimes at the interior of the impoundment. This process creates a gently sloping sand beach adjacent to the embankment crest and places the slimes and the water pond in the interior of the impoundment.

Method 2, single-stage cyclone separation with separate discharges, results in a similar positioning of materials within the impoundment but replaces the simple gravity settling of hydraulic separation with mechanical size separating devices called cyclones. Typically, the cyclones are placed on a moveable base and positioned on the crest of the impoundment. They mechanically separate the sand from the slimes and discharge these two materials via pipelines to different parts of the impoundment; sands to the dam crest and beach, slimes to the interior of the impoundment beyond the sand beach. The moveable cyclones are repositioned to place tailings in the correct sequence to construct the impoundment.

***Embankment Drainage***. For stability purposes it is necessary to control the seepage of water from within the impoundment outward through the embankment. The general goal is to keep the water draining outward through the embankment from seeping out from the downstream face of the dam. For this reason, the embankments are designed to provide preferential seepage paths to direct the outwardly flowing water into drainage collection systems from which it is pumped back into the impoundment.

Alternative II proposes to place free-draining material in the starter dams and a series of blanket drains constructed along the toe of the embankment. These facilities could be connected to a series of pipe drains to route the intercepted drainage to collection stations from which it will be pumped back into the impoundment. These drains, combined with the sandy zone created by the beach and maintaining the operational water pond no closer than 400 feet from the dam crest, are intended to direct outward seepage to the drainage systems and prevent it from exiting on the face of the dam (Dames & Moore 1993).

***Consolidation of Tailings***. As previously discussed, the upstream style of tailings embankment incorporates tailings beach sand and slimes into the structural mass of the retention embankment. Therefore these materials must be sufficiently strong to ensure a safe structure. In general, as the wet beach sand and slimes are progressively buried by later deposits, the weight of the overlying material squeezes out the water and causes the tailings to compress and increase in density. This process, known as gravity consolidation, leads to increasingly closer contact between the tailings particles and increasing strength of the tailings.

This increase in strength with increasing density is important in providing a safe tailings embankment under normal conditions, and is especially vital to providing adequate safety during earthquake events. It is particularly important that the tailings be sufficiently strong to resist the occurrence of seismic liquefaction; a process where fully saturated, fine sand can lose most of its strength when subjected to the repeated shaking caused by a nearby strong earthquake. This form of strength loss has been responsible for the failure of poorly constructed tailings impoundments and is a primary design issue for upstream-style embankments.

The resistance of saturated tailings to seismic liquefaction is influenced by many factors, but the two most important are the density of the tailings and the level of earthquake shaking occurring at the tailings disposal site. In general, the greater the density of the tailings, the higher the level of earthquake shaking they can endure without undergoing liquefaction.

For Alternative II, it is proposed that gravity consolidation could result in sufficient tailings density to resist seismic liquefaction under the earthquake shaking expected at the site. ASARCO commits to substantiate the required density during the final design phase of the project (Dames & Moore 1993).

***Design Earthquake Acceleration.*** In order to design a liquefaction-resistant tailings impoundment it is necessary to define the level of earthquake shaking that may occur at the site. One accepted method to define this level is to estimate the peak acceleration of the shaking motion based on the length of active nearby faults and the distance between the faults and the site. This method results in the estimation of the ground acceleration expected from the maximum probable earthquake (MPE). For the proposed action, the design earthquake acceleration from the MPE is estimated to be 0.12g (in seismic engineering the acceleration of the ground caused by earthquake shaking is typically presented as a fraction of the acceleration of earth's gravity and denoted by the unit "g") (Dames & Moore 1993). This design acceleration is based on a magnitude 7.0 earthquake occurring on the Bull Lake Fault, approximately 18 miles from the site. Modelling used a vertical alignment of the fault.

***Soft Foundation Conditions.*** Several of the preliminary investigative borings conducted along the alignment of the embankment have encountered layers of soft clay. To date, these soft clays appear to be primarily located in the northwest portion of the impoundment area in the vicinity of the north starter dam (Dames & Moore 1993). Clays of this type are commonly encountered when investigating foundation conditions and often require special consideration due to their strength behavior.

In a similar fashion to the tailings discussed above, soft clays are subject to gravity consolidation and will increase in strength as they densify under the weight of overlying material. Therefore, the weight of the tailings placed above any soft clay layers will cause an increase in both density and strength of the clay. However, because the water must be squeezed out of the clay in order to allow consolidation to occur, the speed of consolidation and hence the gain in strength is controlled by how fast the water can be forced from the clay. In addition, attempting to speed the process by quickly applying a very large load in order to more quickly force out the water will usually lead to a rapid loss of strength in the clay which may create instability in the foundation.

To account for the possible existence of soft clays in the foundation, Alternative II proposes two standard engineering remedies for the condition: 1) controlled loading, and 2) wick drains. Controlled loading involves placing the weight on the soft clays at a rate that causes consolidation but does not exceed the strength of the clay. In this case, this involves controlling the construction timing of the starter dams and the tailings embankment according to the consolidation of the foundation (Dames & Moore 1993).

Since the allowable rate of consolidation is controlled by the rate at which water can be safely forced out of the clay, the consolidation rate can be increased by affording the water short paths of flow from the clay. Wick drains are a standard engineering device to supply these short flow paths and enhance the rate of consolidation in clays. Wick drains are specialized fabric ribbons that are inserted on a close spacing into the clay layer. They act as a series of "wicks" to increase the flow of water from the clay to the surrounding more permeable soils.

***Construction Monitoring.*** Construction of the tailings disposal facility continues throughout the entire mine life, therefore it must be monitored over this period to assess both its conformance to the initial design and it performance in meeting the design goals. A construction monitoring plan is part of this alternative. Due to the dependence of any such plan on the final design of the facility, the details of the plan must be developed in concert with the final design. However, a preliminary construction monitoring plan is included in the proposed design (Dames & Moore 1993) and is summarized in Chapter 2.

***Agency Review and Approval of a Final Design.*** Agency review and approval is not specifically included in the proposed action (Dames & Moore 1993). However, because the design is still at a preliminary stage and the stability of the structure is critical, the Agencies would require review and approval of the final design prior to issuing a permit.

The purpose of Agency review of final design is to recognize that the tailings disposal alternatives are preliminary designs based on limited site data and that the final design is likely to include modified engineering elements as well as features not included in the preliminary designs. This is the expected evolution of an engineering design for a facility of the size and complexity of a 100-million-ton tailings impoundment. Therefore, the Agency review function is presented to indicate the scope of technical review the Agencies would exercise throughout the final design process for the tailings impoundment.

The Agencies would offer critical comments and suggestions about the developing design. The review would encompass the technical aspects of the design as they relate to both the short-term and long-term stability of the embankment. In addition, the review would determine if the final design conforms to the general range of engineering elements presented in the preliminary design to the extent that environmental impacts from construction of the final tailing facility are not significantly different from those described in this EIS.

If the final design met the above criteria, then it would be accepted by the Agencies and approved for construction without the need for further extensive NEPA or MEPA compliance activities.

### Third-Party Design Evaluation

The proposed tailings disposal facility, an upstream impoundment located at the Rock Creek site (Alternative II), has been reviewed by two separate consulting engineering firms under contract to DSL. The reviewers produced three reports at various stages of the EIS process. These reports are:

Chen-Northern. 1990. "Technical Feasibility Assessment, Preliminary Tailings Impoundment Design, ASARCO Rock Creek Project". February, 1990.

Klohn Leonoff. 1991. "ASARCO Rock Creek Project, Technical Evaluation of Preliminary Tailings Impoundment Design". December, 1991.

Klohn Leonoff. 1992. "Rock Creek Tailings Project, Review Update". March, 1992.

In general, these reviewers determined the following:

1. The Rock Creek site was suitable for construction of a staged embankment tailings impoundment of the size required by the proposed project, but the existence of soft clay in parts of the foundation would require special consideration in the final design.

2. The use of upstream construction was not adequately supported by the available information and that substantial engineering justification for the upstream method or modification of the design (such as using a centerline type of construction) with adequate engineering justification would be required before the design should be accepted by the Agencies.

### Modified Centerline Construction at the Rock Creek Site (Alternatives III and IV)

Alternatives III and IV use the "Revised Alternative Impoundment Design" submitted by ASARCO (Dames & Moore 1993). This alternative design is a modified centerline style. Features of this tailings disposal design are presented below.

***Modified Centerline Embankment.*** The tailings impoundment is raised using a combination of the centerline and upstream methods. For the first seven years the impoundment is constructed using the centerline method followed by the upstream method for the remainder of the facility life (Dames & Moore 1993).

***Location.*** The tailings disposal facility located at a single site near the confluence of Rock Creek and the Clark Fork River. The site covers approximately 324 acres (Dames & Moore 1993).

***Disposal Technology.*** The tailings disposal facility is an impoundment built with slurry deposited tailings initially placed behind starter dams constructed of local soil and/or rock (Dames & Moore 1993). Through time, the height of the deposited tailings exceeds that of the starter dams and the tailings are a self-supporting structure.

***Embankment Stability Issues.*** There are four primary issues that the tailings facility design must account for in order to demonstrate an acceptable level of stability: 1) adequate protection from overtopping and washout by a very large storm event, 2) accounting for the low strength of the soft clay zones known to exist in the embankment's foundation, 3) providing an adequate assessment of the tailings resistance to liquefaction during earthquake events, and 4) providing sufficient drainage within the embankment to control the water level within the tailings retention embankment. These issues are discussed in the following sections.

- *Storm Water Control.* The tailings facility has two storm water control design elements: 1) Diversion structures to route storm runoff from outside of the immediate impoundment area around the tailings facility, and 2) containment within the impoundment of storm water that falls directly in the tailings facility. The diversion structures are designed to pass the calculated probable maximum flood (PMF). The impoundment would also contain the PMF during its operational life, however due to its construction sequencing, this may encroach upon the 400-foot operational beach width during the early stages of the impoundment (Dames & Moore 1993).

- *Tailings Water Reclaim System.* The tailings facility would have a tailings water reclaim system to recycle water from the tailings impoundment to the mill for continued mineral processing. The system would consist of a pumping station within the tailings impoundment and a pipeline to the mill. The reclaim pipeline would parallel the tailings slurry pipeline transporting tailings from the mill to the tailings impoundment (Dames & Moore 1993).

- *Tailings Embankment Seepage Collection/Return System.* The embankment of the tailings impoundment would seep water from inside the impoundment. This embankment seepage would be collected at the toe of the embankment and returned to the impoundment via a pumping system (Dames & Moore 1993).

- *Material Segregation and Placement.* Two methods of material separation and placement are proposed depending on the season of year. The proposed methods of separation are: 1) double-stage cyclone separation during the warmer months (April through November), and 2) single-stage cyclone separation during the winter (December through March). Tailings are placed using pipe discharge of separated materials to the appropriate part of the impoundment (Dames & Moore 1993).

  The cyclone separation system would include two material separation facilities: 1) a central cyclone station permanently located immediately to the east of the impoundment, and 2) two secondary sets of cyclones located on the crest of the dam. These secondary cyclones would be skid-mounted and capable of being moved as the embankment grew.

  During warmer months, both cyclone system would operate to generate sufficient high-quality sand to construct the shell of the dam. During this time, the central cyclone station would initially split the whole tailings into a slimes fraction and a sand/slimes mixture. The slimes would be piped to the interior of the impoundment and the sand/slimes mixture would be piped to the secondary cyclones on the dam crest. The secondary cyclones would separate the sand/slime mixture into a clean sand product and a slimes fraction. The clean sand would be used in construction of the exterior sand shell of the embankment and the slimes would be deposited in the interior of the impoundment. Sufficient clean sand would be produced to allow all sand raises to be constructed during these warmer months.

  During colder months, only the central cyclone station would be operated with the slimes continuing to be deposited in the interior of the impoundment and the sand/slime mixture being placed upstream of the previously constructed sand shell lift.

- *Embankment Drainage.* For the same stability reasons previously presented, the tailings embankment design must account for internal drainage of tailings water. This design proposes to replace the free-draining starter dams and blanket drains presented in Alternative II with a 200-foot-wide shell of free-draining sand placed on the outside of the embankment with material from the double-stage cycloning (Dames & Moore 1993). The intercepted seepage would be collected and returned to the impoundment as proposed in Alternative II.

  *Consolidation of Tailings.* As previously discussed, both the centerline and upstream methods of embankment construction may incorporate tailings beach material into the structural mass of the retention embankment. Therefore, this material must be sufficiently strong to ensure a safe embankment.

  The relationship between strength and density of tailings is previously discussed. The same gravity consolidation to achieve the required density of embankment tailings is proposed for this design, however there is an additional commitment to mechanically compact the beach tailings if construction monitoring indicated the necessary tailings density determined during final design was not occurring from gravity consolidation alone (Dames & Moore 1993).

***Design Earthquake Acceleration.*** This preliminary design incorporates two levels of seismic acceleration in the design. The first level is for an MPE of magnitude 7.0 on the Bull Lake Fault 18 miles away, resulting in a maximum site shaking of 0.16g for postoperational analyses to determine the long-term seismic liquefaction susceptibility of the reclaimed tailings disposal facility (Dames & Moore 1993). This calculation assumes the fault dips towards the site, thus lessening the straight-line distance between the location of earthquake energy release and the site. The second level is for short-term analyses prior to reclamation of the facility. The short-term acceleration is based on the definition of the operational basis earthquake (OBE), or one that has a 90 percent risk of not being exceeded in any 50 years. This design estimates the peak seismic acceleration at the Rock Creek site to be 0.035g for the OBE (Dames & Moore 1993).

***Soft Foundation Conditions.*** The alternative design presents three engineering elements to account for the soft clays located in the northwest portion of the impoundment area (site of the north starter dam) and suspected to exist at other locations. The primary method to deal with the suspected presence of soft clay elsewhere than in the northwest portion of the area is to excavate the weak soil and replace it with a compacted fill. In this design, this is proposed for areas beneath the main and south-wing starter dams if soft clays are determined to exist in these areas during final design (Dames & Moore 1993).

Two methods are proposed for the soft clay located in the northwest part of the area beneath the north starter dam. A berm of cycloned sand would be constructed along the toe of the embankment following completion of the initial sand shell in year 7 of construction. This berm would be constructed during years 8 through 13 of the impoundment life and would serve to flatten the overall downstream slope of the embankment in this area (Dames & Moore 1993). In essence, flattening the slope reduces the loads causing instability in the foundation and does not overload the soft clay. In addition, this design proposes to include a concrete keyway/shear wall in the foundation of the north starter dam. This concrete keyway/shear wall would be constructed beneath the upstream toe of the starter dam for the north starter dam and sized to provide additional resistance to a sliding failure through the foundation beneath the dam (Dames & Moore 1993).

***Construction Monitoring.*** Construction of the tailings disposal facility would continue throughout the entire mine life, therefore it must be monitored over this period to assess both its conformance to the initial design and it performance in meeting the design goals. The same construction monitoring plan as proposed for Alternative II is included in this design (Dames & Moore 1993). Due to the dependence of any such plan on the final design of the facility, the details of the plan must be developed in concert with the final design. However, a preliminary construction monitoring plan is presented in Chapter 2.

***Agency Review and Approval of a Final Design.*** The purpose of Agency review of the final design is to recognize that the tailings disposal alternatives are preliminary designs based on limited site data and that the final design is likely to include modified engineering elements as well as features not included in the preliminary designs. This is the expected evolution of an engineering design for a facility of the size and complexity of a 100-million-ton tailings impoundment. Therefore, the Agency review function is presented to indicate the scope of technical review the Agencies would exercise throughout the final design process for the tailings impoundment.

The Agencies would review the final design with the assistance of a technical review panel hired by the Agencies. The panel could include at least three independent experts with experience in tailings impoundment design in addition to one or more representatives from both KNF and DSL.

The review panel would be charged with reviewing the final design for the tailings impoundment as developed by ASARCO, offering critical comment and suggestion to the developing design. The Agencies would have to approve the final design. The review would encompass the technical aspects of the design as they relate to both the short- and long-term stability of the embankment. In addition, the review would determine if the final design conformed to the general range of engineering elements presented in the preliminary design to the extent that environmental impacts from construction of the final tailing facility were not significantly different from those described in this EIS.

If the final design met the above criteria, then it would be accepted by the Agencies and approved for construction without the need for further extensive NEPA or MEPA compliance activities.

### Third-Party Design Evaluation

The modified centerline design was reviewed by the same two consulting engineering firms under contract to DSL to review the upstream design. Although no final report was produced during this review, the Agencies are satisfied that the modified centerline approach could lead to a prudent and acceptable final design.

## SUBSIDENCE

The potential environmental consequences from the collapse of underground openings include surface subsidence, a change in the ground water regime, and drainage of surface waters.

Surface subsidence is the physical manifestation of the collapse of underground openings. The potential for, and amount of, surface subsidence is very much dependant on the strength of the rock, the amount of physical support provided to this rock mass, and the stress distribution in the surrounding area.

Underground mining disrupts the established stress environment and changes the extent and direction of the stress field in the surrounding rocks, resulting in a period of stress redistribution.[1] Regardless of rate of stress redistribution, fracturing of the rock mass commonly occurs. Fracturing influences a rock's inherent strength and can affect the rock's ability to support itself. If the weight of the rock mass above the underground opening is more than the rock of the surrounding pillars and back can support, fracturing could extend to the surface. Fractured rock around an underground opening, such as a mine tunnel or room, will fall into the opening over time, gradually filling the space. Falling rock fragments do not fit together like a 3-dimensional jigsaw puzzle; numerous air pockets or voids between and around the rock fragments result in a bulking or swelling of rock volume. The caving will continue until there is no more space for falling rock; it is stopped by interception of more competent rock above the caving, or subsidence of the ground surface.

ASARCO has not generated an extensive data base of analytical rock mechanics for the Rock Creek site with which to develop its mine plan. Most of this data would be obtained during the construction of the exploration adit as well as both mine adits. Much of the information regarding rock strength, artificial support, and room-and-pillar dimensioning is extrapolated from experience gained at their Troy Mine. It is difficult to predict the consequences of ASARCO's proposed plan at Rock Creek based on the current level of information, however, a preliminary assessment prepared by Camp, Dresser & McKee, Inc. (1989) concluded that the potential for subsidence was remote. Using rock strength information from the Montanore Project and the Troy Mine, the probability of subsidence at Rock Creek is extremely remote.

Two reports (Redpath 1991; Agapito 1991) addressed mine planning and included information on subsidence at the Montanore site. These reports concluded that given the proposed mine plan (which is also room-and-pillar) and geologic conditions, the potential for subsidence at Montanore is minimal provided adequate underground monitoring and rock analysis are carried out to refine the mine design once development is underway. Given similarities in rock strength and mining method between Rock Creek and Montanore, subsidence is not likely to occur at Rock Creek. ASARCO has not committed to any specific level of monitoring and rock analysis. A monitoring and reporting plan would need to be developed with the Agencies prior to mine development.

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[1] Crystalline rock, such as the Revett quartzite that hosts the Rock Creek ore body, is prone to explosive stress release, often occurring as rock bursts.

Standard laboratory tests on rock samples from the Troy Mine and Montanore found high compressive strengths, and overall rock quality to be good to excellent (Redpath Engineering, Inc. 1991). Owing to the depth of the deposit, the strength of the overlying rock, and the relative thin ore horizon, neither subsidence nor extensive rock fracturing is expected at the creek. However, in those areas where the ore zone is near-surface or thicker, or there exist geologic anomalies such as faults, stresses may develop within the surrounding rock which could initiate subsidence-inducing fracturing.

ASARCO has identified thick ore horizons (over 150-feet thick) next to the Copper Lake and the Moran faults. An area south of Cliff Lake contains mineralization very near to the surface. ASARCO's plan is to mine within 100 feet of the ground surface in areas where the ore body outcrops (ASARCO, Incorporated 1994). There exists the minor possibility that these areas (see **Figure E-2**) could experience some surface subsidence under Alternative II if the stress field was larger than the strength of the local rock.

Site-specific geologic discontinuities such as jointing, faults, sills or dikes affect the strength and response of the surrounding rock during mining. At Rock Creek, the nature and extent of such discontinuities, other than major faults, have not been identified in detail, hence their influence on the potential for subsidence is somewhat unknown. Experience from other mines exhibiting similarities (mining method, depth to ore, ore thickness) to Rock Creek, such as the White Pine Mine in Michigan and mines in the Missouri Lead District, indicates geologic conditions can have a profound influence on pillar performance and ultimately subsidence (D. Tesarik, U.S. Bureau of Mines, personal communication, November 1994). This experience underscores the importance of assessing the geologic environment and identifying geologic features such as faults that can influence mine stability.

The potential impacts to the ground surface, the ground water regime, or to any surface lakes or streams in the area are unknown. Preliminary drilling data from Cliff and Copper lakes suggest that the mineralization is at such a depth under the lakes that the probability of there being any fracturing or subsidence due to mining would be extremely small. The precise association between the lake and the groundwater regime is ill-defined at present, and any conclusions would need to be further substantiated by additional subsurface data from the immediate area. Other possible expressions of subsidence in the areas previously identified would probably be limited to minor surface disruption such as cracking or small surface depressions. In areas other than the Copper Lake Fault zone, the Moran Fault zone, and any near surface mineralized zones, subsidence is highly unlikely given the strength of the rock, thickness of the mineralization and the depth to ore. The potential for subsidence above thick or shallow ore bodies is minor but potentially significant.

ASARCO's intention to remove select pillars towards the end of mining may cause rock fracturing and subsidence in areas not previously predisposed to subsidence. This phenomenon has been observed in other room-and-pillar operations, and is especially prevalent in coal mines. The likelihood for this happening would depend on the strength of the remaining pillars and the stress field in the surrounding rock. A comprehensive testing and monitoring program to provide the information necessary to fully assess the potential for such an event has not been proposed by ASARCO. The potential for subsidence from removal of pillars is moderate and potentially significant.

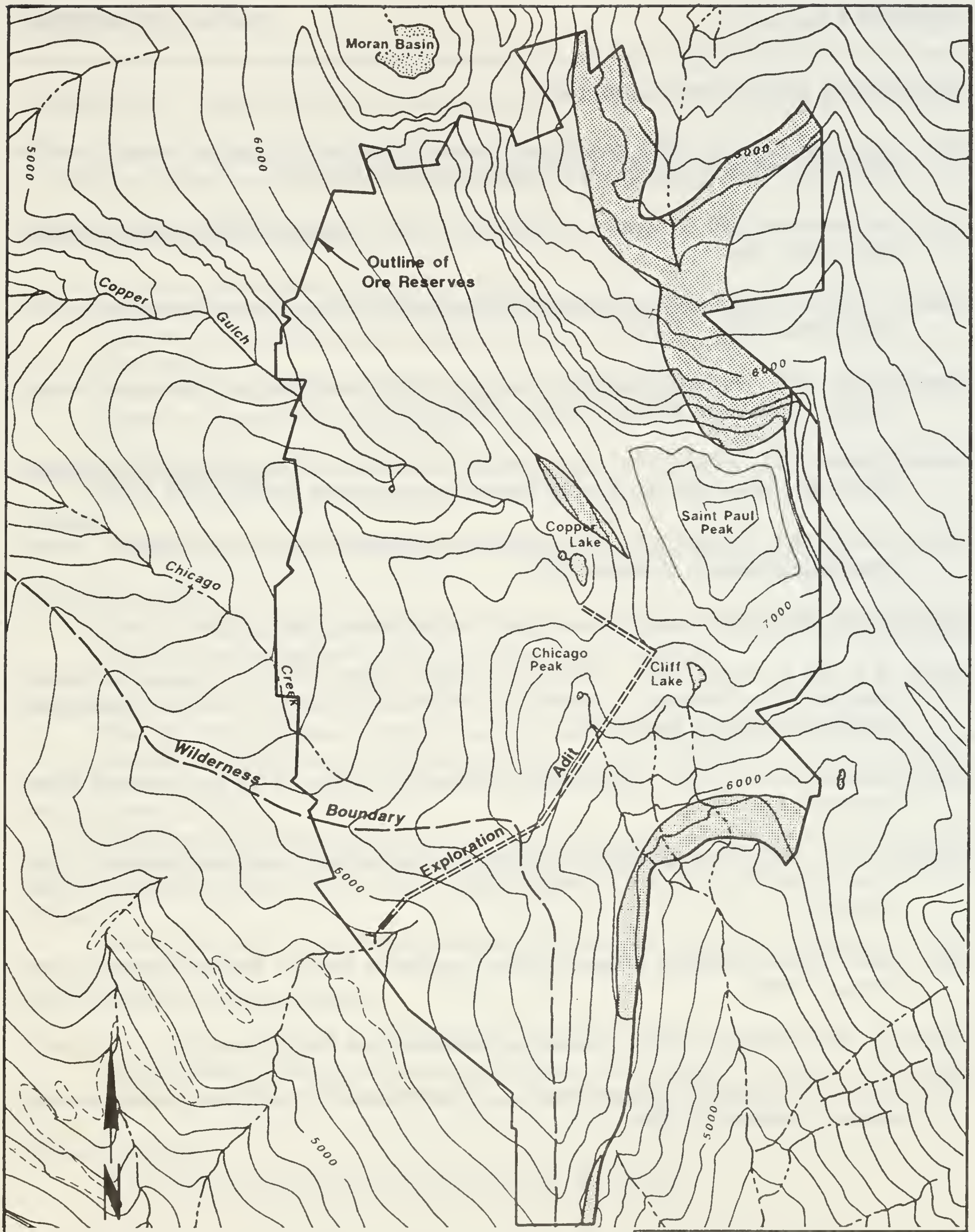

FIGURE E-2
Areas of Potential Subsidence
Rock Creek Project

Source: Thompson 1990.

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## APPENDIX F - DESCRIPTION OF REAGENTS

Table F-1 lists reagents used in the mill process and their estimated annual consumption. Table F-2 describes reagent handling. (ASARCO 1986-87:Vol. 2, Part 1, pp. 26-29)

### Chemical Composition of Reagents

Potassium amyl xanthate: $C_5H_{11}$ - O - CS - $SK^+$
Yarmor F pine oil (terpene): Mostly a mixture of $C_{10}H_{18}OH$ and $C_{10}H_{16}$.
Dow 250: Polypropylene glycol methyl ether: $CH_3$ - $(O\text{-}C_3H_6)_N$ - OH
$N = 8\text{-}10^3$
Am Cy Superfloc S-5595: Anionic polyacrylamide copolymer.
Orzana A: Ammonium lignosulfonate.

### Toxicity of Process Reagents

Xanthate:

Xanthates are poisonous when absorbed through the skin, inhaled, or swallowed.

Yarmor-F-Pine Oil:

Pine oil is not considered to be toxic but can cause irrigation to skin and mucous membranes, headaches, and palpitations if inhaled, and should not be ingested.

Dow 250:

Dow 250 is not considered to be toxic but may cause moderate eye irritation and should not be ingested. Dow 250 does not vaporize significantly at room temperature.

Am Cy Superfloc S-5595:

S-5595 may irritate skin on contact. It is poisonous if ingested and the solvent vapors may cause chemical pneumonia. Minimal eye irritation may also result from contact.

Orzana A:

Not regarded as toxic. Inhalation and contact with skin and eyes should be avoided.

### Spill Procedures for Process Reagents

Xanthate:

Spillage would be diluted with water and returned to the process. No drains in the reagent mixing and storage areas would permit release of spills outside the complex.

Yarmor-F Pine Oil:

Spills would be flushed with water and returned to the process.

Table F-1: Description of Reagents

| Reagent | Purpose | Addition Point | Annual Consumption (Pounds) | Pounds Per Ton Ore |
|---|---|---|---|---|
| (Potassium Amyl) Xanthate | Flotation Collector | Primary Ball Mills Regrind Mill, All Flotation | 216,000 | 0.06 |
| Hercules Yarmor-F Pine Oil | Frother | All Flotation | 54,000 | 0.015 |
| Dow 250 | Frother | All Flotation | 10,800 | 0.003 |
| American Cyanamid Superfloc S-5595 | Flocculant | Concentrate and Tailings Thickener | 108,000 | 0.03 |
| Orzana A | Binder | Railroad Cars of Concentrate | 10,800 | 0.003 |

Table F-2: Handling of Reagents

| Reagent | Delivery | Storage | Mixing Facility |
|---|---|---|---|
| Xanthate | Truck | 275, 300 and 330 lb. drums | 6' x 6' mixing tank<br>6' x 6' storage tank |
| Hercules Yarmor-F Pine Oil | Tank Truck | 8,000 gallon storage tank | 6' x 6' mixing tank<br>6' x 6' storage tank |
| Dow 250 | Truck | 450 lb. drums | Mixed with pine oil to 15% solution |
| Am Cy Superfloc S-5595 | Tank Truck | 2,300 gallon storage tank | 4,500 gallon mixing tank |
| Orzana A Binder | Truck | 50 lb. bags | 3' x 6' mixing tank |
| Nalco 84DC225 | Truck | 571 lb. drums | None; direct addition |

Dow 250:
Spills would be diluted with water and returned to the process.

Am Cy Superfloc S-5595:
Spillage would be absorbed with a commercial absorbent and shoveled into waste cans to await permanent disposal.

Orzana A:
Spills would be swept with other contaminated material and shoveled into waste cans to await permanent disposal.

## Exposure Limits to Flotation and Process Reagents for Employees

Reagents used in the extraction process are all commonly employed in flotation recovery plants worldwide. They are received either as liquids diluted with water or added directly to the process, or as solids diluted with water or added directly (e.g., Xanthate and Orzana A).

Depending on toxicity of the reagent, employees who mix reagents would be required to wear rubber gloves, aprons, dust masks or respirators, and safety glasses or full face shields. The plant would be designed to store reagents in clean, dry areas away from heat and sources of ignition. Handling and mixing facilities would be separate.

No gases are to be used in processes within the complex. The American Conference of Governmental and Industrial Hygienists (ACGIH) has issued Threshold Limit Values (TLV)[1] for Chemical Substances and Physical Agents in the Work Environment (1983-84). Of the reagents proposed, none have established TLVs. Therefore, employee exposure would be governed by suppliers' recommended procedures as outlined in various "Material Safety Data Sheets."

## Behavior of Reagents in the Process

Xanthate:
Used as collectors in the flotation process, xanthates attach to sulfide particles and remain with the concentrates. Negligible quantities would go to the tailings area.

Pine Oil and Dow 250:
These two reagents are mixed into a frother solution throughout the flotation process to maintain a stable froth bed. They would remain with the concentrates or degrade in the process circuit. Negligible amounts would go to tailings.

Am Cy Superfloc S-5595:
This reagent is used in the concentrate and final tailings thickeners to settle suspended solids.

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[1] TLV/TWA-Time weighted average concentration for a normal 8-hour work day and 40-hour work week, to which nearly all workers may be exposed, daily, without adverse effect.

The fraction used in the concentrate thickener would remain with the concentrate. The fraction fed to the final tailings thickener would go with solids to the tailings impoundment as a highly sheared (decomposed) hydrocarbon.

Orzana A:

This reagent is used at the railroad siding where final concentrates are shipped for sale. It is used as a glue to control dust losses of concentrate during transit and remains entirely with the concentrates.

# APPENDIX G - REVEGETATION PLANS

## I. SUMMARY OF ASARCO'S REVEGETATION PLAN - ALTERNATIVE II

### TABLE G-1.
### ASARCO's Proposed Final Seeding Mixtures for the Tailings Impoundment Area, Facilities and Mine Areas, and the Transportation Corridor

| Common Name | Scientific Name | Drill Seeding rate[1] (pounds/acre) | Seeds per square foot[2] |
|---|---|---|---|
| GRASSES[3] | | | |
| Redtop | *Agrostis alba* | 0.1 | 11.0 |
| Meadow foxtail | *Alopecurus pratensis* | 1.0 | 13.0 |
| Mountain Brome | *Bromus marginatus* | 5.0 | 10.0 |
| Orchard-grass | *Dactylis glomerata* | 1.0 | 15.0 |
| Sheep fescue | *Festuca ovina duriuscula* | 1.0 | 13.0 |
| Common timothy | *Phleum pratense* | 0.5 | 15.0 |
| Big bluegrass | *Poa ampla* | 0.5 | 10.0 |
| Canada bluegrass | *Poa compressa* | 0.2 | 11.0 |
| **Subtotal Grasses** | | **9.3** | **98.0** |
| FORBS[4] | | | |
| Common yarrow | *Achillea millefolium* | | |
| Aster | *Aster* spp. | | |
| Bunchberry dogwood | *Cornus canadensis* | | |
| Lupine | *Lupinus* spp. | | |
| Penstemon | *Penstemon* spp. | | |
| Alsike clover[5] | *Trifolium hybridum* | | |
| **Subtotal Forbs** | | **1-2** | **10-20** |
| SHRUBS[4,6] | | | |
| Western serviceberry | *Amelanchier alnifolia* | | |
| Snowbrush ceanothus | *Ceanothus velutinos* | | |
| Red-osier dogwood | *Cornus stolonifera* | | |
| Creambush ocean-spray | *Holodiscus discolor* | | |
| Shrubby cinquefoil | *Potentilla fruticosa* | | |
| Chokecherry | *Prunus virginiana* | | |
| Currant | *Ribes* spp. | | |
| Rose | *Rosa* spp. | | |
| White spirea | *Spiraea betulifolia* | | |
| Common snowberry | *Symphoricarpos albus* | | |
| **Subtotal Shrubs** | | **3-5** | **5-10** |
| **TOTAL** | | **13.3-16.3** | **113-128** |

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[1] Drill seeding would be done on most slopes at 3:1 (33%) or less. Broadcast seeding methods would be used on steeper slopes or rocky areas in which case the seeding rate would be doubled. Hydroseeding (a broadcast method) would only be used where feasible.

[2] The seeding rate assumes pure live seed (PLS) which is a certified rating for each seed lot adjusted for purity and germination percentage. The target is for 120 PLS/sq.ft.

[3] Grasses would be seeded on the Tailings Impoundment, Facilities and Mine area, Transportation Corridor. Mountain brome would be seeded at a slightly higher rate on the transportation corridor. An annual cereal grain would be included for rapid initial stabilization, as appropriate.

[4] Rates given for forbs and shrubs are a combination of any or all species.

[5] To discourage wildlife use, alsike clover would not be seeded on the transportation corridor; it would be seeded in other areas upon completion of operations.

[6] Shrubs would be seeded on most disturbances but exceptions include: a) the tailings impoundment dam face - shrubs would be planted (not seeded); and b) the transportation corridor - shrubs would not be seeded or planted except as needed on road cut-and-fill slopes.

## TABLE G-2.
## ASARCO's Proposed Final Seeding Mixtures for the Exploration Adit

| Common Name | Scientific Name | Seeding Rate[1] (pounds/acre) | Seeds[2] per square foot |
|---|---|---|---|
| GRASSES[3]: | | | |
| Redtop | *Agrostis alba* | 0.2 | 22.0 |
| Meadow foxtail | *Alopecurus pratensis* | 1.0 | 21.0 |
| Mountain Brome | *Bromus marginatus* | 5.0 | 10.0 |
| Sheep fescue | *Festuca ovina duriuscula* | 2.0 | 31.0 |
| Big bluegrass | *Poa ampla* | 1.0 | 20.0 |
| Alsike clover | *Trifolium hybridum* | 1.0 | 16.0 |
| TOTAL | | 10.2 | 120 |

[1] Broadcast seeding methods would be used.

[2] The seeding rate assumes pure live seed (PLS) which is a certified rating for each seed lot adjusted for purity and germination percentage; the target is for 120 PLS/sq.ft.

[3] Beargrass (*Xerophyllum tenax*), a forb, may be seeded, if seed is available; shrubs and trees would not be seeded or planted. The final revegetation seeding mixtures would be applied throughout the mine life (years 0-35) as areas are prepared for recontouring and topsoiling. Interim revegetation would be applied to areas that require stabilization; these areas would be reseeded with the final seed mixtures and/or plantings after recontouring and topsoiling. Interim revegetation consists of seeding with the same grass mixtures proposed for final revegetation.

## TABLE G-3.
## ASARCO's Proposed Final Tree Planting Rates for the Tailings Impoundment Area and Facilities and Mine Areas[1]

| Common Name | Scientific Name | Stocking Rate[2] (trees/acre) |
|---|---|---|
| Tailings Impoundment Top and Associated Areas | | |
| Western larch | *Larix occidentalis* | 133 |
| Western white pine | *Pinus monticola* | 133 |
| Ponderosa pine | *Pinus ponderosa* | 133 |
| Douglas-fir | *Pseudotsuga menziesii* | 266 |
| Tailings Impoundment Dam Face | | |
| Ponderosa Pine | *Pinus ponderosa* | 332 |
| Douglas-fir | *Pseudotsuga menziesii* | 333 |
| Facilities and Mine Area | | |
| Western larch | *Larix occidentalis* | 133 |
| Englemann spruce | *Picea engelmannii* | 133 |
| Lodgepole pine | *Pinus contorta* | 133 |
| Douglas-fir | *Pseudotsuga menziesii* | 266 |

[1] No trees would be planted on the transportation corridor.

[2] Stocking rates would total 665 trees/acre on all sites.

## II. AGENCY MITIGATIONS THAT WOULD BE IMPLEMENTED UNDER ALTERNATIVE III OR IV

ASARCO would develop a revised revegetation plan to be reviewed and approved by the Agencies. The detailed plan would address all elements currently proposed and those necessary to meet agency mitigations identified in the EIS. The overall goal is to achieve long-term ecosystem stability and potential while incorporating goals and mitigations for other resources. The plan elements would be thoroughly documented to ensure that the rationale for each element is well understood. This is particularly important for plant species selection. In view of the long-term nature of the proposed project, the following practices are identified with the intention of providing flexibility as environmental conditions and agency policies change and of ensuring that state-of-the-art knowledge is incorporated. The revegetation plan would be coordinated in conjunction with other resource mitigations and monitoring plans

### Species Selection

The objective would be to develop a revegetation plan that meets as well as balances a variety of short- and long-term needs including soil stabilization, restoration of soil productivity, species selection and plant community successional considerations for wildlife and wildlife habitat needs, and visual resource enhancement.

Grass and forb seed mixes and tree and shrub plantings would be reassessed to address site-specific objectives including:

- environmental conditions of recontoured areas
- visual setting of recontoured areas
- substrate (tailings, waste rock, etc.) and soil chemical and physical conditions
- short-term needs to stabilize soil but not be attractive to wildlife
- long-term needs for visuals (rapid screening)
- long-term needs for wildlife
    - browse, forage and cover
    - arrangement of wildlife habitat components in the Rock Creek watershed (travel corridors, snags, winter range, etc.)
- long-term needs for fisheries (shading, food source base, etc.)
- seed collection from the permit area and propagate seeds and plantings to ensure locally adapted and genetically compatible stock
- choice of rapidly establishing grasses that will not hinder native colonization or that would spread off the reclaimed area
- choice of locally native pioneer species (such as fireweed and pearly everlasting) for rapid stabilization
- hand planting of trees, shrubs, etc. on steep slopes
- consideration of successional changes in plantings and seedings to best achieve overall watershed and habitat conditions.

Revegetation plan elements would be documented to ensure that the rationale for species choices and revegetation actions are well understood. For guidance, the Agencies suggest using Region 1 Native Plant Handbook (USDA Forest Service Northern Region 1995) and other appropriate guidelines in existence at the time of project implementation. The goal for tree stocking is to have a minimum of 150 live trees per acre 30 to 50 years after planting. Assuming 30% mortality, the proposed stocking rate of 240 trees per acre would result in 168 trees per acre.

Suggested seeding and planting mixes include:

**TABLE G-4.**
**Agencies' Suggested Seeding Mixes for the Tailings Impoundment (Dam face and top)**

| Common Name | Scientific Name | Stocking Rate |
|---|---|---|
| | | (trees/acre)[1] |
| TREE PLANTING | | |
| Lodgepole pine | *Pinus contorta* | 80 |
| Ponderosa pine | *Pinus ponderosa* | 20 |
| Western larch | *Larix occidentalis* | 20 |
| Douglas-fir | *Pseudostuga menziesii* | 20 |
| Western white pine | *Pinus monticola* | 20 |
| Aspen | *Populus tremuloides* | 40 |
| Cottonwood | *Populus trichocarpa* | 40 |
| | TOTAL TREES | 240 |
| SHRUB PLANTING | | (shrubs/acre)[1] |
| Alder | *Alnus sinuata* | 24 |
| Snowbush ceanothus | *Ceanothus velutinus*[2] | 10 |
| Redstem ceanothus | *Ceanothus sanguineas*[2] | 10 |
| Mockorange | *Philadelphus lewisii* | 8 |
| Snowberry | *Symphoricarpos albus* | 8 |
| Kinnikinnik | *Arctostaphylos uva-ursa* | 8 |
| Buffaloberry | *Shepherdia canadensis* | 8 |
| White spirea | *Spirea betulifolia* | 8 |
| Ninebark | *Physocarpus malvaceus* | 8 |
| Woods rose | *Rosa woodsii* | 8 |
| | TOTAL SHRUBS | 100 |
| GRASS/FORB SEEDING | | **Drill Seeding Rate (pounds per acre)** |
| Cereal rye | *Secale cereale* | 2.5 |
| Sterile wheat | | 2.5 |
| Idaho fescue | *Festuca idahoensis* | 1.5 |
| Bluebunch wheatgrass | *Agropyron spicatum* | 1.5 |
| Pinegrass | *Calamagrostis rubescens* | 1.0 |
| Elk sedge | *Carex geyerii* | 1.0 |
| Fireweed | *Epilobium angustifolium* | 1.5 |
| Pearly everlasting | *Anaphalis margaritacea* | 1.0 |
| Yarrow | *Achillea millefolium* | 1.0 |
| Pussytoes | *Antennaria rosea* | 0.5 |
| Strawberry | *Fragria vesca* | 0.5 |
| Strawberry | *Fragaria virginiana* | 0.5 |
| | TOTAL GRASSES/FORBS | 15 |

[1] Containerized stock would be preferable; include western red cedar (*Thuja plicata*) at 5 trees/acre on cooler/moister positions.
[2] Inoculated with appropriate nitrogen-fixing bacteria.

## TABLE G-5.
## Agencies' Suggested Seeding Mixes for the Mill Site (Alternative III or IV)

| Common Name | Scientific Name | Stocking Rate |
|---|---|---|
| TREE PLANTING | | (trees/acre)[1] |
| Lodgepole pine | *Pinus contorta* | 80 |
| Ponderosa pine | *Pinus ponderosa* | 5 |
| Western larch | *Larix occidentalis* | 20 |
| Douglas-fir | *Pseudostuga menziesii* | 20 |
| Western white pine | *Pinus monticola* | 20 |
| Aspen | *Populus tremuloides* | 30 |
| Cottonwood | *Populus trichocarpa* | 30 |
| Engelmann spruce | *Picea engelmannii* | 35 |
| | TOTAL TREES | 240 |
| SHRUB PLANTING | | (shrubs/acre)[1] |
| Alder | *Alnus sinuata* | 20 |
| Snowberry | *Symphoricarpos albus* | 20 |
| Oceanspray | *Holodiscus discolor* | 20 |
| Serviceberry | *Amelanchier alnifolia* | 20 |
| Snowbush ceanothus | *Ceanothus velutinus*[2] | 10 |
| Redstem ceanothus | *Ceanothus sanguineas*[2] | 10 |
| | TOTAL SHRUBS | 100 |
| GRASS/FORB SEEDING | | Drill Seeding Rate (pounds per acre) |
| Cereal rye | *Secale cereale* | 2.5 |
| Sterile wheat | | 2.5 |
| Rough fescue | *Festuca scabrella* | 1.5 |
| Pinegrass | *Calamagrostis rubescens* | 1.0 |
| Elk sedge | *Carex geyerii* | 1.0 |
| Beargrass | *Xerophyluum tenax* | 2.0 |
| Fireweed | *Epilobium angustifolium* | 1.5 |
| Pearly everlasting | *Anaphalis margaritacea* | 1.0 |
| Yarrow | *Achillea millefolium* | 0.5 |
| Pussytoes | *Antennaria rosea* | 0.5 |
| Strawberry | *Fragria vesca* | 0.5 |
| Strawberry | *Fragaria virginiana* | 0.5 |
| | TOTAL GRASSES/FORBS | 15 |

[1] Containerized stock would be preferable.

[2] Inoculated with appropriate nitrogen fixing bacteria.

## TABLE G-6.
## Agencies' Suggested Seeding Mixes for the Exploration Adit

| Common Name | Scientific Name | Stocking Rate |
|---|---|---|
| | | (trees/acre)[1] |
| TREE PLANTING | | |
| Subalpine fir | *Abies lasiocarpa* | 80 |
| Engelmann spruce | *Picea engelmannii* | 80 |
| Douglas-fir | *Pseudostuga menziesii* | 80 |
| | TOTAL TREES | 240 |
| SHRUB PLANTING | | (shrubs/acre)[1] |
| Alder | *Alnus sinuata* | 16 |
| Snowberry | *Symphoricarpos albus* | 16 |
| Oceanspray | *Holodiscus discolor* | 16 |
| Serviceberry | *Amelanchier alnifolia* | 16 |
| Snowbush ceanothus | *Ceanothus velutinus*[2] | 10 |
| Redstem ceanothus | *Ceanothus sanguineas*[2] | 10 |
| Rocky Mountain maple | *Acer glabrum* | 16 |
| | TOTAL SHRUBS | 100 |
| GRASS/FORB SEEDING | | Drill Seeding Rate (pounds per acre) |
| Cereal rye | *Secale cereale* | 2.5 |
| Sterile wheat | | 2.5 |
| Rough fescue | *Festuca scabrella* | 1.5 |
| Pinegrass | *Calamagrostis rubescens* | 1.0 |
| Elk sedge | *Carex geyerii* | 1.0 |
| Beargrass | *Xerophyluum tenax* | 2.0 |
| Fireweed | *Epilobium angustifolium* | 1.5 |
| Pearly everlasting | *Anaphalis margaritacea* | 1.0 |
| Yarrow | *Achillea millefolium* | 0.5 |
| Pussytoes | *Antennaria rosea* | 0.5 |
| Strawberry | *Fragria vesca* | 0.5 |
| Strawberry | *Fragaria virginiana* | 0.5 |
| | TOTAL GRASSES/FORBS | 15 |

[1] Containerized stock would be preferable.

[2] Inoculated with appropriate nitrogen fixing bacteria.

## INTRODUCTION

This appendix contains the Agency-modified or -generated conceptual monitoring plans for alternatives III and IV. ASARCO would develop a final monitoring plan for approval by the Agencies prior to project startup. All plans would need to identify trigger or alert levels, which, when reached, would require ASARCO to implement a corrective action plan. Corrective action plans for the most likely scenarios also need to be developed and approved prior to project startup.

### Reporting

All monitoring would require an annual report unless otherwise specified. The format and requirement needs for reporting would be reviewed and finalized by the Agencies. Reports would be submitted to other review agencies as identified by KNF and DSL.

After submittal of a monitoring report, the Agencies may call a meeting with all other relevant agencies to review the monitoring plan and results, and to evaluate possible modifications to the plan or permitted operations.

## AIR QUALITY MONITORING PLAN

Ambient air quality monitoring would be required as a condition of the air quality permit for the project. This most likely would include three to four particulate monitoring sites in the vicinity of the plant and tailings areas and a meteorological (wind speed and direction) monitoring system. All monitoring must be performed according to state and federal quality assurance procedures.

Performance testing (measurement of the particulate emission rate) on the wet scrubber controlling emissions from the secondary crusher would also be required to verify compliance with the applicable emission standard (0.05 grams per dry standard cubic meter). Following the initial tests, operational parameters of the scrubber would be monitored on an ongoing basis. These parameters include scrubbing liquid flowrate and the change in pressure of the gas stream through the scrubber.

Air Quality Division personnel would perform on-site inspections of the operation on a random basis on a frequency of at least once per year. Air monitoring reports would be submitted and reviewed on a quarterly basis. The overall effectiveness of the proposed air pollution control measures, with emphasis on the adequacy of wind erosion prevention at the tailings impoundment, would be evaluated in this way on an ongoing basis. Standard quality assurance/quality control procedures for air monitoring programs would be implemented as a condition of the air quality permit.

## WATER RESOURCES MONITORING PLAN

### Introduction

This plan provides the conceptual framework necessary for development of a water resources monitoring program for the ASARCO Rock Creek Project. ASARCO submitted its own version of a water resources monitoring plan, however, the Agencies believe that several important elements were missing from this plan.

Only a final Agency-approved monitoring plan would be implemented. The final approved plan would contain specific information on sample location, chemical parameters for analysis, laboratory detection limits, frequency of data collection, and reporting requirements. The water resources monitoring program would begin during the first quarter of construction of the evaluation adit, and would be maintained during the life of the project as well as after reclamation for a period of time to be specified by the Agencies.

The goals of the water resource monitoring are:

- to quantify any measurable environmental impacts accompanying construction, operation, or reclamation of the ASARCO Rock Creek project;
- to evaluate the accuracy of impacts described in the EIS; and
- to determine whether alterations of project operations or additional mitigative actions are required to correct any unanticipated impacts encountered, or to prevent future violations of regulatory requirements.

A comprehensive monitoring system network would be established to evaluate potential impacts associated with the underground mine, mill, utility corridor, water treatment facility, and tailings impoundment. Data would be collected and evaluated in detail using standard statistical analyses to determine if differences exist between:

- an upstream (or upgradient) reference station and the corresponding downstream station;
- sampling intervals (monthly, quarterly, annually);
- high and low flow events.

Operational data would also be compared to data collected during baseline conditions to document changes in water quality.

This conceptual monitoring plan is divided into several elements:

- surface water monitoring
- ground water monitoring
- facility water balance and chemistry
- analytical parameters and methods
- quality assurance and quality control program

- remedial action plan
- reporting

These elements are discussed in detail below.

## Surface Water Monitoring

Surface water quality samples would be collected and analyzed during the construction, operation, and reclamation phases of the proposed project on a quarterly basis. Water samples would also be collected during temporary facility shutdowns or mine closure. Surface water stations would be located on the East and West forks of Rock Creek, the mainstem of Rock Creek, Miller Gulch, the Clark Fork River and other locations as determined by the Agencies. Sampling locations would be coordinated with the aquatic monitoring program. The surface water monitoring program, including the location of all stations evaluated during the baseline data collection program, would be finalized based on Agency review and approval. The rationale and requirements for monitoring surface water resources at specific stations during the construction, operation, and reclamation phases of the proposed project would be discussed in ASARCO's final water resources monitoring plan.

Monitoring of lake levels at Cliff and Copper lakes would also be part of the surface water monitoring program. This plan would be coordinated with the aquatics monitoring plan and wetlands monitoring and mitigation plans.

## Ground Water Monitoring

Ground water monitoring data would be collected on a quarterly basis during construction, operation, and reclamation phases, as well as during temporary facility shutdowns. Ground water would be monitored in the underground mine, upgradient and downgradient of the mill, upgradient and downgradient of the proposed tailings impoundment, and from the tailings impoundment perimeter pump-back well system. Monitoring well and perimeter pump-back well locations, and sampling frequency would be reviewed and finalized after consultation with the Agencies. Water quality and water level data from monitoring wells and static water level data from piezometers would be collected. Static water level data from piezometers located along the perimeter of the tailings impoundment would be critical to evaluate potential seepage impacts to ground water or surface water resources. Ground water from all existing domestic water supply wells downgradient of the proposed tailings impoundment would also be collected and analyzed.

Split samples from monitoring and domestic wells would be periodically collected and analyzed by DHES to verify ASARCO's data. Split samples from domestic wells would be offered to owners. The Agencies would consider the actual facility water balance data, estimates of seepage, and results of the ongoing ground water monitoring program in determining how long monitoring of private domestic water supply wells should continue. At a minimum, ground water quality sampling and analysis would continue at least until bond release.

## Facility Water Balance and Chemistry

A detailed facility water balance and analysis of water and waste water chemistry would be maintained, the details of which would be specified in the final water resources monitoring plan. The purpose of the facility water balance would be to provide an assessment of the inflow, outflow, and general water or waste water chemistry associated with the underground mine, water treatment facility, and tailings impoundment. Monitoring information would be used to modify, as necessary, operational water handling, and to develop a post-mining water management plan. As part of this monitoring, the following aspects of the project water balance would be measured:

- the volume of excess water stored underground
- mine reservoir water quality
- mine adit discharge and water quality
- the amount of tailings slurried to the impoundment and the percent solids of the slurry
- the amount and source(s) of fresh makeup water to the mill
- the amount of reclaimed tailings water returned to the mill
- the water quality of tailings decant water
- the amount and quality of water pumped from the seepage collection ponds
- treatment facility influent flow and water quality
- flow rate and quality of water discharged to the Clark Fork River
- the amount and source of water used for dust suppression and irrigation
- the amount and source of water discharged to any land application disposal areas
- pan evaporation and precipitation data at the tailings impoundment site

## Parameters and Analytical Methods

At a minimum, the 21 parameters evaluated in the EIS would be retained for analysis in the water resources monitoring program. All water samples would be analyzed using procedures with the lowest possible laboratory analytical detection limits, and using procedures described in 40 CFR 136, EPA-600/4-79-020, or methods shown to be equivalent. Collection, storage, and preservation of water samples would be in accordance with EPA procedures (EPA-600/4-4-82-029). Grab samples would be collected from streams and ground water samples would be obtained with a bailer or submersible pump. Samples would be cooled immediately after collection. Metals in water samples would be preserved by adding nitric acid in the field to lower the pH to less than 2.0. Ground water samples for metals analysis would be filtered through A 0.45 micron filter to allow measurement of dissolved constituents. All field procedures would be consistent with procedures in the U.S. Geological Survey's National Handbook of Recommended Methods for Water-Data Acquisition.

## Quality Assurance/Quality Control Program

Quality assurance (QA) assures the integrity and reliability of monitoring and measurement data. Quality control (QC) is the application of procedures to evaluate data acquisition techniques and analyses according to established criteria. QC procedures define whether sampling and analytical techniques are in or out of control with reference to applied standards and control limits.

A specific QA/QC program would be approved by the Agencies to guarantee the quality and source of all data collected. This program would include sample documentation, as well as sample control and data validation.

The documentation and sample control portion of the QA/QC plan would be designed to document and track samples from the time of collection through reporting of analytical results. Elements in this portion of the plan include sample identification protocol, the use of standardized field forms to record all field data and activities, and the use of chain-of-custody sample tracking and analysis request forms.

The purpose of data validation would be to ensure that data collected during the monitoring phase would be of known and acceptable quality. Quality control samples would include blind field standards, field cross-contamination blanks, and replicate samples.

### Remedial Action Plan

As part of this water resource monitoring plan, a remedial action plan would be developed for the Rock Creek project. Objectives of the remedial action plan would be:

- to define remedial action criteria and statistically based methods for determining whether significant impacts to surface or ground water resources occur during the project's construction, operation, and reclamation phases;
- to identify key players and their respective roles and responsibilities for implementing the remedial action plan;
- to identify, illustrate, and schedule the decision-making process associated with remedial actions; and
- to prepare a list of potential remedial action alternatives for various degradation scenarios.

### Reporting

ASARCO would prepare quarterly and annual reports to summarize information and data obtained during implementation of the ASARCO Rock Creek water monitoring program. The report would include data tabulations, analysis of trends, statistical computations, maps, cross sections, and diagrams needed to clearly describe hydrologic conditions. ASARCO would also submit computerized data and analyses in a format acceptable to the Agencies.

## WILDLIFE MONITORING PROGRAM

Monitoring plans would be developed for several wildlife subjects based on the conceptual plans provided below. Monitoring plans would vary depending upon the species or subject being monitored.

In some cases, monitoring would occur on subjects for which insufficient baseline data exist to fully estimate potential impacts or changes. Monitoring would identify the status of these subjects during or after mining activities but the data would not be compared with inadequate premine data.

Currently, the Forest Service and DFWP are developing or implementing monitoring plans or studies for some species or subjects. Where feasible and appropriate, ASARCO would contribute funding to these efforts in place of initiating a separate and redundant monitoring activity.

The goal of the wildlife monitoring program is to determine project-related impacts on existing wildlife populations. If impacts were identified, then appropriate remedial action plans would be developed and implemented. This monitoring program would be started during the first quarter of exploration adit construction and would be comprised of monitoring and reporting for the following elements:

- neotropical migrant bird;
- mountain goat;
- sensitive animal species; and
- road closure.

## Neotropical Migrant Bird Monitoring

This plan would coordinate with current programs in place or initiated by state and federal agencies and private organizations. The goal of this monitoring would be to gain additional information about neotropical migrant birds, population trends, species composition changes, and their responses to mine-related impacts.

## Mountain Goat Monitoring

Mountain goats would be monitored for their responses to mine-related impacts. Limited baseline data would hinder comparisons of premine status with mine-life or post-mine status. However, information gained would be useful in determining population trends, habitat use, and to some extent mine-related impacts. The monitoring plan would integrate aspects of a mountain goat monitoring plan/study that has already been developed by DFWP. The plan would need to specify the sampling and analysis methods to be used and would be reviewed and approved by the Agencies.

## Sensitive Animal Species Monitoring

A forest-wide monitoring program for sensitive species is currently being implemented by KNF. ASARCO would contribute funding to this existing effort. The goal of this monitoring item would be to gain more information about sensitive species, habitat use, and mine-related impacts.

### Road Closure Monitoring

Road closures would be monitored for their effectiveness in excluding motorized access. This would include assessing KNF administrative and unauthorized road use and the ultimate effectiveness of closure. This monitoring plan would take into account road closures proposed for grizzly bear mitigation as well as existing road closures. The plan would be developed in coordination with KNF.

## AQUATICS/FISHERIES MONITORING PLAN

### Introduction

A detailed monitoring plan is available in the project file at DSL (dated November 18, 1994). The following is a summary of the highlights of that plan.

The primary reason for monitoring aquatic biota is to determine if mine project activities cause impacts to aquatic resources. Aquatic macroinvertebrates[1] are one of the most reliable organisms to monitor for water quality because they are almost always present in a stream under a wide range of conditions, from clean to polluted. In contrast, fish are more difficult to monitor on a regular basis because they are not found in all drainages, can be transient within a reach, excluded from areas by physical barriers (e.g., waterfalls), and generally have more limited habitat requirements. Aquatic monitoring serves the following additional functions:

- determines whether BMPs and other mitigation are working (e.g., is sediment being effectively controlled from roadway activities?).
- documents the presence of aquatic macroinvertebrates and periphyton[2] in the stream reflecting the short- and long-term quality of the water and sediments. In contrast, water samples, collected only at a specific time, may miss potential pollution events between sampling. Certain species can tolerate polluted conditions (e.g., metals, fine sediments) while others only exist in clean waters.
- determines whether aquatic life standards are successful at protecting the resident aquatic life.
- detects (periphyton monitoring) effects of nutrient loading (e.g., nitrate residues from blasting agents) to a stream.

Aquatics and fisheries monitoring would be required to determine if impacts occur to these resources. ASARCO would need to monitor benthic macroinvertebrates, fine sediments, periphyton, fish populations, and metals accumulations in fish tissues. The timing and location of aquatic biological monitoring should be coordinated with the surface water quality monitoring program (Klemm et al.

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[1] Aquatic organisms, such as insects or worms, that inhabit stream bottoms.

[2] Algae attached to submerged surfaces such as rocks or logs.

1990). Monitoring would begin during the first quarter of exploration adit construction and continue through postmining reclamation.

ASARCO would compare data collected from the monitoring stations to that collected during preconstruction baseline studies. In addition, data collected from potential impact sampling stations also would be compared to upstream reference stations. The monitoring plan may be modified by the agencies in response to the information collected to reflect concerns specific to the construction, operation, and postoperational time periods.

In the event of a temporary mine closure, monitoring would continue unless the agencies agreed to reduce or suspend monitoring requirements.

### Benthic Macroinvertebrates

ASARCO would maintain detailed maps and photographs of each sampling site so that the sties can be accurately relocated each year. In addition, permanent markers would be installed at each study site.

Quantitative macroinvertebrate data would be collected three times per year at approximately ten sampling stations. Sampling stations would be selected to represent a range of impacted and unimpacted conditions. In order to reduce variability, sampling areas should be restricted to those of a similar physical nature as much as possible (Klemm et al. 1990). It may be necessary to locate a suitable reference station outside the Rock Creek drainage. Samples would be taken in a quantity and manner approved by the Agencies. If possible, sampling would be done in the same or similar manner as the baseline samples.

Data analysis techniques would include, but are not limited to, the following:

- standing crop
- taxa richness
- percent dominant taxon
- ratio of functional feeding groups
- Shannon-Weaver diversity index
- equitability (Lloyd and Bhelardi 1964)
- community similarity index
- pollution tolerance indices
- EPT/C (total mayflies, stoneflies, and caddisflies divided by total chironomids)
- EPT abundance and richness

Data would be compiled by season and comparisons would be made between potential impact sites and reference sites. Data would also be compared with baseline data.

In addition, bioassays would be conducted with water samples taken from locations to be specified by the Agencies. Likely sampling locations are the mine adit waste water, tailings impoundment seepage water, and Rock Creek water downstream of the mill site. Test animals would be selected by the Agencies prior to the start of monitoring.

### Fine Sediments

Fine sediment loading of spawning gravels in Rock Creek would be estimated using at least two different sediment analysis techniques[3] at a variety of sampling stations within the drainage. Sampling techniques, times, and locations were to be approved by the Agencies prior to the start of monitoring.

### Periphyton

Monitoring would be done at the same times and locations as the benthic macroinvertebrates sampling, unless otherwise specified by the Agencies. Sample collection, processing, and analysis techniques (Protocol II, control site protocol) as described in Bahls (1993) would be used.

### Fish Populations

Fish populations in Rock Creek would be monitored at 2-year intervals at a variety of stream reaches representing impacted and unimpacted conditions. Baseline sampling sites should be included in the monitoring plan sites. Population densities of each fish species captured through electrofishing would be estimated, where adequate sample sizes permit, using the Seber-LeCren multiple pass method or comparable method to make population estimates.

### Bioaccumulation of Metals in Fish Tissue

Fish would be collected from mainstem Rock Creek and the East and West forks of Rock Creek for metals analysis. Tissue samples from collected fish would be analyzed to determine concentrations of zinc, copper, and mercury and compared to baseline levels. Test procedures and analysis would be the same as those used for baseline testing, unless changed by the Agencies. Sampling would be done annually for 5 years and then every 3 years until reclamation was complete, unless otherwise required by the Agencies.

### Spills and Accidents

In the event of an accidental discharge of toxic or hazardous materials or sediments, supplemental monitoring maybe required by the Agencies if there is a reasonable possibility that the environment could be adversely affected. ASARCO would be required to immediately report all such accidental discharges to permitting Agencies. The type, frequency, and location of monitoring would be contingent on the circumstances of the accident. Mitigations and recommended monitoring for several likely spill or accident scenarios would be developed as part of an Emergency Action Plan prior to mine operation. This would facilitate the process should a spill or accidental discharge of toxic or hazardous material occur.

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[3] Recommended methods include substrate score and McNeil Core substrate sampling methods.

### Quality Assurance/Quality Control

To provide QA/QC for these studies, ASARCO would maintain a permanent taxonomic reference collection that contained all benthic species and representative samples of all dominant and indicator taxa of periphyton[4] collected from project area streams. Taxa identification in this collection must be documented and confirmed by taxonomic experts who must be selected in concurrence with the Agencies. This reference collection would be maintained by ASARCO through the period of postoperational monitoring. Following this period, the collection should be transferred to a depository selected by the Agencies for permanent scientific reference.

### Reporting

ASARCO would submit an annual aquatic monitoring report that contained summaries of all aquatic monitoring data collected during the previous year. Each report must also discuss trends in plant and animal population patterns and evaluate changes in terrestrial and aquatic habitat quality, based on all data collected to date for the project. Recommendations in these reports could include modification to increase monitoring efficiency or to improve the quality of the data.

The purpose of the baseline program is to sufficiently describe the aquatic community that existed prior to mine development and compare the baseline data to construction and operations data. Without an adequate baseline, it is difficult to determine whether changes in an aquatic community are caused by mine disturbances or by natural occurrences (i.e., seasons). The aquatics baseline data collected within the ASARCO Rock Creek project area from 1985-1988 appears to be inadequate for the following reasons:

- reference sites would not be comparable to potential impact sites;
- seasonal data for some sites are incomplete;
- some baseline sites were not sampled consistently because of flow problems;
- the alternative mill site location at the confluence of the East and West forks of Rock Creek could require selection of additional sites (for Alternative IV); and
- additional surveys are needed to better understand bull trout populations and the amount and condition of spawning habitat.

Prior to the beginning of the proposed project, an updated baseline monitoring program would be developed and implemented with approval by the Agencies.

## RECLAMATION MONITORING PLAN

This plan provides the conceptual framework necessary for development of a reclamation monitoring program for the ASARCO Rock Creek Project. ASARCO had included a revegetation and a soils and erosion control monitoring plan in its application, however, the Agencies believe that those plans needed to be expanded to reduce the risk of sedimentation and revegetation failure (see Chapter 2 and **Appendix G**).

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[4] All non-diatom taxa would be preserved in vials and representative permanent slide mounts made for diatom taxa.

The final plan would contain specific information on soil salvage and handling, sampling methods, frequency of sampling, chemical parameters and analysis methods for any soil testing, and reporting. The reclamation monitoring program would begin as soon as construction activities were initiated and would continue until the Agencies released the reclamation bond.

The overall reclamation goal is to achieve short- and long-term stability and utility of the disturbed lands. The conceptual reclamation monitoring plan contains several elements:

- monitoring soil salvage, handling and quality;
- soil erosion and construction monitoring; and
- revegetation monitoring.

## Monitoring of Soil Salvage and Handling

Monitoring would take place throughout mine life during soil salvaging and replacement to ensure that adequate reclamation materials were salvaged, stored and respread according to a revised and expanded soil salvage and handling plan. Soil depths would be verified using standard Soil Conservation Service methods.

Soil salvage activities would be monitored to verify depth and suitability (primarily rock content) of each lift. Monitoring would also verify that each lift was stored in appropriate locations. Soil replacement activities would be monitored to verify that lifts were replaced in the proper sequence and with sufficient depths. A 100 x 100-foot grid would be established on reshaped landforms at final reclamation of disturbances. After soil replacement, the grid would be resurveyed to verify proper total soil replacement depths. The average of all sample points per reclaimed unit must meet the soil replacement depth identified for each disturbance area. In addition, no sample point on the grid should have less than 50 percent of the required replacement depth.

Stored soil would be tested before respreading to identify what, if any deficiencies or limitations in soil physical and chemical properties existed that may affect plant growth. Appropriate fertilizer, liming, organic matter, and other amendments would be determined.

## Soil Erosion and Construction Monitoring

This component of the reclamation monitoring plan has two phases: monitoring of active construction and long-term maintenance monitoring. In general, monitoring would be done to identify areas where slumps, rills, gullies, and sheet wash were occurring. Any erosion problems identified would be immediately corrected.

ASARCO would conduct annual audits of best management practices (BMPs) implemented during construction of roads and other project facilities. This monitoring would be ongoing throughout road and mine construction and into the operational period for the tailings impoundment area. If deviations from BMPs were found, ASARCO would immediately correct the practice as well as resource damage that had occurred. In addition, sediment source surveys would be conducted in the Rock Creek and Bull River drainages. ASARCO would be responsible for mitigating sediment sources on NFS lands equivalent to 130 acres of disturbed land.

Routine long-term maintenance monitoring would be conducted during spring and fall and after heavy storm events. This monitoring would focus on reclaimed and disturbed areas. If necessary, immediate erosion control measures would be applied such as reseeding, mulching and other appropriate BMPs.

### Revegetation Monitoring

Revegetation would be monitored annually during the growing season to identify areas where vegetation was failing and determine the cause. Revegetation monitoring should be conducted in conjunction with the routine soil maintenance monitoring. Systematic visual inspections would be conducted to identify areas that have inadequate cover, poor seedling growth, damage, or poor nutrition.

If problem areas were identified, ASARCO would need to identify the cause. If the cause appeared to be related to soil infertility or toxicity, then a soil testing program would need to be implemented for the problem area. Soil chemistry tests would be conducted to ascertain macro- and micronutrient status, pH, cation exchange capacity, and potential toxicity and heavy metal problems. Problems could also be caused by inadequate watering or inappropriate species or varieties being planted. Appropriate remedial actions would be taken to correct the problem.

Revegetation success of tree seedlings would be critical to mitigate the visual impacts of project facilities. A sampling design for monitoring tree stocking would be specified in the plan and approved by the Agencies. Other parameters such as ground cover, production or biomass, and plant density could be proposed by ASARCO to quantitatively evaluate the revegetation success of grasses, shrubs and forbs. Tree establishment surveys are recommended at years 1, 3, and 5 after planting.

Post-closure monitoring of trees should be conducted for up to 20 years after mining to determine if visual mitigations have been achieved. Frequency and amount of monitoring would be approved by the Agencies.

### Reporting

An annual report would describe any reclamation problems that were identified and remedial measures taken.

# APPENDIX I - MCKAY CREEK ALTERNATIVE DESCRIPTION

## Alternative Description

### Tailings Impoundment

This conceptual alternative tailings impoundment site would have been in the McKay Creek drainage, about 2 miles east of the mouth of Rock Creek. This location was selected because the topography allows a reasonable expectation that a downstream tailings impoundment could have been constructed at the site, thereby eliminating seismic liquefaction as a major engineering design issue. As indicated on **Figure I-1**, such a structure, sized to contain 100 million tons of tailings from the proposed mine, could have been placed across the narrow mouth of the valley. At project completion, this dam would have had a width of about 1,500 feet and would have been about 180 feet high. Tailings would have been impounded behind the dam for a distance of about 2 miles, covering approximately 510 acres.

### Landownership

Portions of three sections of land would have been involved in siting an impoundment at this location. One section, Section 36, is owned by the State of Montana. The remaining two are corporately owned by two logging companies -- Crown Pacific and Pack River -- and other smaller landowners.

The slurry and reclaim lines would have been routed from the confluence mill site parallel along FDR No. 150 then FDR No. 1022 to the impoundment. Two pump stations would have been needed because the slurry would have had to go up hill after leaving FDR No. 150 (see **Figure I-1**).

### Tailings Impoundment Seepage and Storm Water Control

During operations, water that would have seeped through the dam would have been intercepted with a downstream seepage collection and containment system. Seepage would have increased over the life of the project. Ground water capture wells and corresponding monitoring wells would have been placed downgradient of the impoundment dam similar to Alternative II.

The McKay Creek drainage basin above the conceptual impoundment encompasses approximately 7,000 acres, with elevations up to 7,583 feet. McKay Creek would have been diverted into a 15,000-foot-long temporary channel on the south side of the valley at an elevation slightly higher than the final design height of the impoundment. This diversion would have been designed to handle the probable maximum flood during the mine's operational life. Based upon engineering estimates of a 100-year flood and slope, a concrete, trapezoidal channel, with side-slopes of 1.5 to 1 would have been approximately 40-feet wide at the top (assuming a bottom width of 20 feet) and would have ranged in depth between 7 and 10 feet. The outfall of the channel would have been engineered to dissipate the energy of the water prior to its return to the natural channel below the dam. A settling pond would need to have been constructed downstream of the spillway over the embankment face.

Two intermittent drainages located north of the McKay Creek Valley would either have to have been diverted separately around the impoundment or allowed to drain into the impoundment. Two intermittent drainages south of the valley would have to have been directed into the diversion channel. These four drainages enter McKay Creek below the point of diversion of the main channel. Construction of the McKay Creek diversion dam, road, and ditches would have been concurrent with vegetation clearing for the tailings impoundment.

### Transportation and Utilities

Existing roads would have to have been improved and several new roads would have been constructed to provide access to the McKay Creek tailings impoundment and for installation of the slurry, reclaim, and transmission lines. All lines would have paralleled roads to the tailings impoundment. In addition to the roadwork proposed for Alternative IV, about 4 miles of new roads would have to have been constructed and approximately 3 miles of existing roads would have been improved. FDR No.1022 would have been upgraded to a 14-foot wide gravel road with turnouts (see **Figure I-1**). An additional 6 feet beyond the usual cleared zone (approximately 12 feet for a single-lane road) would have been used for placement of slurry/reclaim pipelines and buried 4.16 kV powerline. To access the top of the dam a new segment of FDR No. 1022 would have been built. ASARCO would have been responsible for building a 2,800-foot, 14-foot-wide gravel connector between FDR nos. 1022 and 2210. ASARCO also would have constructed a 14-foot-wide road off of FDR No. 1022 to provide access to the southern half of sections 35 and 36. Eleven thousand feet of existing FDR No. 150 from Engle Creek to the rail load-out would have been upgraded to a 14-foot gravel surface with turnouts.

### Reclamation

Based on soils information provided by KNF (Kuennen and Gerhardt 1984), average soil depth is 52 inches. Two soil lifts could have been salvaged. The first lift would have included the upper 23 inches of volcanic ash-influenced silt loams. This would result in roughly 1.6 million cu. yd. available for salvage. The second lift would include the next 29 inches. This would result in roughly 1.9 million cu. yd. available for salvage. The total volume would be approximately 3.6 million cu. yd. for salvage and replacement. Up to 4 feet of topsoil could have been replaced over the impoundment if all the soil was salvaged. Because there would have been no concurrent reclamation on the impoundment, all salvaged topsoil from within the McKay Creek drainage would have to have been stockpiled and temporarily revegetated until used for final reclamation. This large volume of topsoil would have been stored in several stockpiles whose locations would need to be identified.

Permanent revegetation of the impoundment face could not have begun until after operations ceased due to the downstream construction method. Revegetation of the surface would have been delayed until the impoundment had dried out enough to support heavy equipment needed for regrading and spreading of topsoil.

The tailings impoundment surface would have been regraded to desired shape, then soil respread and the area revegetated. An engineered streambed would have been constructed to flow across the top

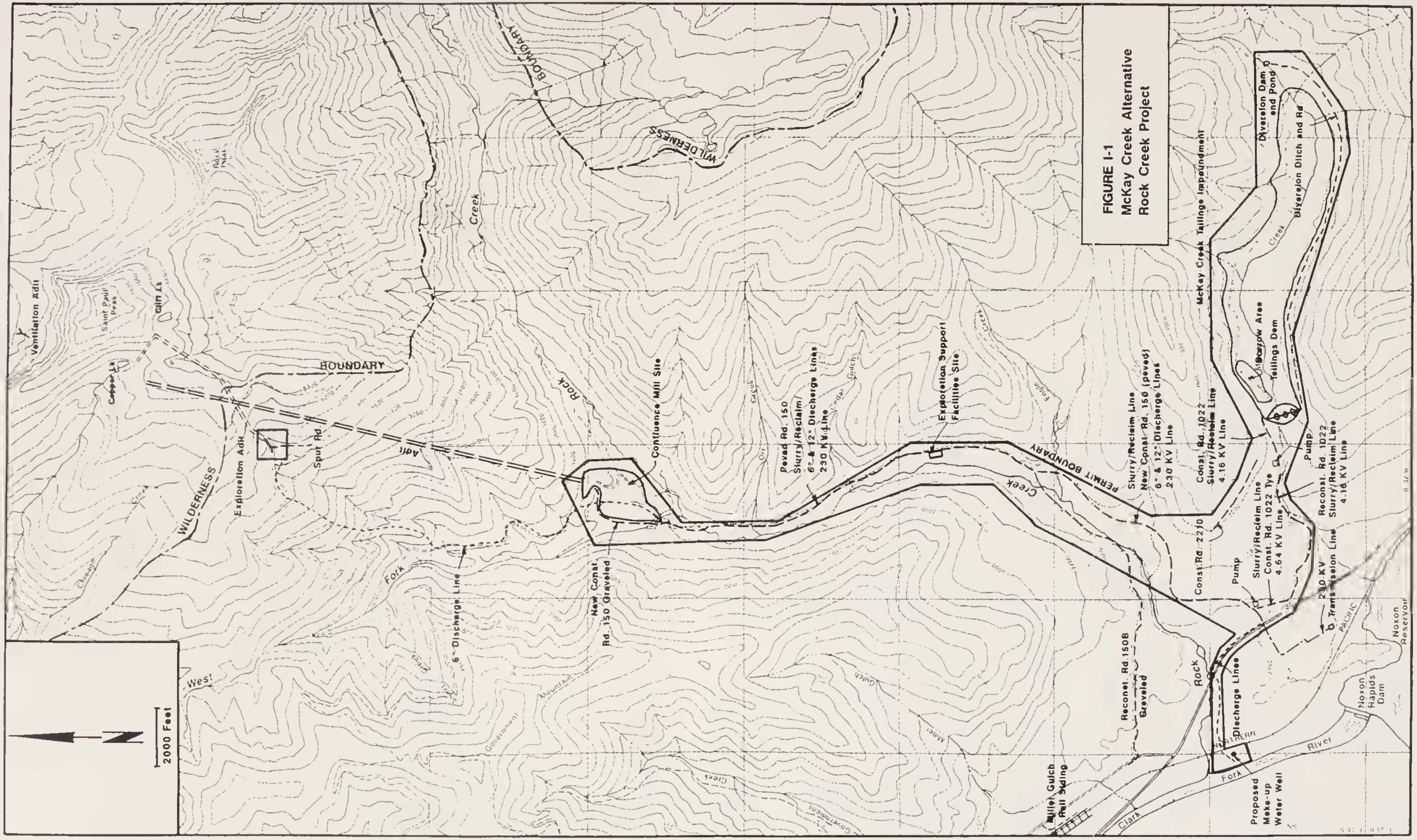

FIGURE I-1
McKay Creek Alternative
Rock Creek Project

of the tailings. After the streambed was built, the diversion would have been removed, thus allowing the creek to flow through the impoundment and over a constructed spillway on the dam. The spillway would have to have been about 90 feet wide by 20 feet deep and engineered for the probable maximum flood (PMF).

## Environmental Consequences

The following sections describe the environmental impacts that would have occurred with the development of the McKay Creek alternative.

### Forest Plan Direction

Impacts to MAs for all facilities but the tailings impoundment would have been similar to Alternative IV. Roads and utilities associated with the McKay Creek impoundment would have been on private land and NFS lands designated as MAs 11 and 13. Several acres of MA 11 and 13 would need to have been redesignated as MAs 23 and 31.

### Air Quality

Use of the alternative tailings impoundment site at McKay Creek would have resulted in a shift of related air emissions and impacts to that area. The downstream impoundment construction method would have caused an increase in potential particulate emissions from wind erosion as compared to the modified centerline construction method (Alternative III). Neither the slight changes in emissions nor the relocation of emissions points would have affected the overall air quality impact of the project.

### Geotechnical Engineering

The McKay Creek impoundment, a downstream design, would have required the least amount of borrow material to supplement the waste rock and sand fraction of the tailings used to construct the embankment. This impoundment should have been the most resistant to earthquake-induced liquefaction without additional design and construction constraints. However, its location, spanning the mouth of a large drainage basin, made it extremely vulnerable to washout in a major flood. The potential results of a flood-induced washout of the McKay Creek impoundment would have been very much like those associated with the loss of either Rock Creek impoundment, except they would have been compounded by the large amount of additional flood water from the 7,000-acre watershed above the impoundment. Such a storm event could have stressed Noxon Rapids Dam from storm waters entering the Clark Fork River upstream.

### Soils and Reclamation

Less borrow material would have been required for the McKay Creek impoundment. However, the exact amount of borrow material needed is unknown. Topsoil and subsoil resources were more than adequate for reclamation purposes. Storage of 3.5 million cu. yd. of topsoil may be difficult. ASARCO would have had to determine how many stockpiles would be required and where they should be located.

Stockpiles would have been located outside the footprint of the impoundment as there would be no concurrent revegetation.

A separate planting plan for the reconstructed stream plan would have been needed in conjunction with the stream channel relocation plan and wetlands mitigation plan to assist in stabilizing the streambanks.

### Hydrology

Impacts to Miller Gulch would have been eliminated under this alternative because the impoundment would not be located in the Miller Gulch drainage. Impacts to surface water quality and quantity, springs and ground water wells, appropriated surface water users in Miller Gulch, and related to seepage of tailings slurry decant water into Miller Gulch would have been eliminated. However, there would still have been some impacts to Rock Creek associated with road construction and the mill operations. The impacts to Rock Creek would have been similar to those associated with the confluence mill site in Alternative IV.

The proposed tailings impoundment would have permanently altered about 510 acres of valley bottom area in the McKay Creek drainage. The diversion of this perennial stream would have resulted in the greatest hydrologic impact to this site by impacting wetlands and riparian habitat. Changes to water quality or water quantity in this stream reach would be minor. However, the impacts of tailings disposal in McKay Creek on water quality and quantity cannot be quantified due to a lack of baseline data for McKay Creek. Therefore, a qualitative analysis is provided.

Sediment may have entered surface waters during road and tailings impoundment construction but would have been minimized by applying BMPs, such as runoff and sediment control techniques. Most road construction activities would have been north of McKay Creek, but one stream crossings would have been necessary to provide access to lands south of the valley. Breaks in the slurry or reclaim pipeline during mine operation may have resulted in spills reaching surface waters and caused an increase in sediment load in the receiving stream.

The tailings water quality would have been similar to the ASARCO Troy tailings water used in the analysis of Alternative II. The rate of seepage would be a function of the permeability of the sediments underlying the impoundment and seepage control designs and would be proportional to the area of the impoundment and the depth of water (head) in the impoundment. Seepage downstream of the dam would have flowed either in ground water within the narrow McKay Creek valley, or discharged into McKay Creek, depending upon the local hydrogeology. The presence of relatively impermeable fine-grained lacustrine sediments over much of the valley floor should have limited the amount of seepage (Thompson 1989). Shallow alluvium is likely present along the valley floor; bedrock and colluvium are exposed along the hill slopes surrounding McKay Creek. Seepage may have migrated within the colluvium along the sides of the impoundment and along the bedrock contact. The depth of the alluvium downstream of the tailings dam and the hydrologic controls in the area are currently unknown. Seepage from the impoundment would have impacted about 1.5 miles of McKay Creek below the tailings impoundment. Water quality in McKay Creek above the tailings impoundment would have remained unaffected by the impoundment. Assuming seepage quantities (50-700 gpm) and qualities similar to those in Alternative II, and similar ground water capture from downgradient wells, impacts to the Clark Fork River from implementation of the McKay Creek alternative would have been similar to the impacts expected from alternatives II through IV.

Based on field inspection, surface water from McKay Creek does not appear to be appropriated for other uses. Therefore, no existing surface water users would have been affected.

The tailings material may not have been stable enough to support a reconstructed stream channel over the reclaimed surface. The fine-grained tailings sediment would have been easily eroded by streamflow and stream channel migration across the impoundment as the McKay Creek stream channel worked to attain an equilibrium. This would have hindered successful revegetation. Continual maintenance of the stream channel would have been necessary. Differential settling of the tailings material would have occurred indefinitely. Water from rerouted McKay Creek likely would have percolated into the tailings material, causing saturation of sediments, ponding, and interruption of the stream channel continuity. Seepage eventually may have drained out below the dam and into the existing McKay Creek channel. The settling pond constructed downstream of the spillway would have further reduced the total suspended sediment load potentially entering McKay Creek and the Clark Fork River after reclamation. However, this settling pond would have needed constant maintenance because sediment eroded from the tailings impoundment and transported over the spillway would have accumulated in this pond. The permanent concrete spillway in the embankment also would have required a long-term maintenance plan to ensure that it functioned.

### Wetlands and Waters of the U.S.

This alternative would have involved the direct filling of 36.96 acres of wetlands and 5.89 acres of Waters of the U.S. in the McKay Creek drainage. Additional wetlands could have been indirectly impacted by the construction of access roads, diversion ditches, topsoil stockpiles, and other facilities associated with a tailings impoundment. Suitable mitigation acreage beyond that identified by ASARCO for Alternative II may not have been in the vicinity to create new wetlands as required under the 404(b)(1) permit process.

Other direct effects generated by the confluence mill site, waste rock dump, exploration adit, and access roads would have been similar to those described for Alternative IV. The 5.36 acres of wetland associated with the Rock Creek tailings impoundment would not have been disturbed.

Indirect effects of this alternative on Waters of the U.S., wetlands, and nearby riparian areas with undelineated Waters of the U.S. and wetlands could not be quantitatively determined from the existing information. Seepage from the impoundment may have created or increased the size of existing Waters of the U.S. and wetlands below the impoundment, however, it is uncertain whether the additional water would have been of acceptable quality or if the functions and values of the existing wetlands would have been affected. Temporary indirect impacts on wetlands and Waters of the U.S. would have occurred during construction of the required tailings dam, impoundment, and associated roads and buildings due to increased sediment to the existing wetlands and Waters of the U.S. Diverting McKay Creek around the tailings impoundment would have caused additional impacts to Waters of the U.S. and associated riparian areas. Proposed BMPs would have reduced sediment contributions to wetlands and Waters of the U.S.

### Aquatic Resources/Fisheries

The effects on the streamflow of Rock Creek would have been similar to Alternative IV. However, there would have been an additional aquatic impact from diverting 15,000 feet of McKay Creek into a channel on the south side of the valley. This could have resulted in the permanent loss of all fisheries and aquatic resources and stream habitat as well as indirect effects up- and downstream. The water would have stayed in this location until the project operation was complete, at which time a stream channel would have been built across the tailings.

When the stream was returned to a constructed channel, it would have flowed across the tailings impoundment. There still would be a fish passage barrier at the engineered spillway. During floods, the stream would have eroded tailings, increasing the level of suspended solids and negatively affecting fish and other aquatic life downstream in McKay Creek and the Clark Fork River (Noxon Reservoir).

Nitrogen-based nutrients in the tailings seepage would have entered McKay Creek (not Rock Creek) and the Noxon Reservoir. Impacts would have occurred to aquatic resources in these bodies of water.

Water temperatures would have been elevated in McKay Creek in the summer months because the stream would have been flowing in a large, open diversion with little shading by shrubs and trees. The exact temperature elevation could not be predicted, however, it is expected that no fish would have survived in this portion of the diversion. Water temperatures would have remained elevated even after the stream was returned to a reconstructed channel on top of the impoundment until vegetation was established to shade the stream.

Fish species such as those found in Rock Creek, may be found in McKay Creek. Due to a lack of data, however, it is not known at this time if bull trout live in McKay Creek although westslope cutthroat trout have been found there. If there were viable populations within the McKay Creek impoundment site area, then the impacts to bull trout as well as to westslope cutthroat trout would have been major and significant because of the loss of habitat, and loss of access between the lower and upper portions of McKay Creek. Conversely, the barrier could have helped isolate a genetically pure strain if a viable population was stranded.

### Biodiversity

Seven known discrete sensitive plant populations would have been affected by the construction of the mill, pipelines, and roads. Construction of the tailings impoundment would not have affected any known sensitive plant populations. It is unknown if any sensitive plant species occur in the portion of McKay Creek drainage that would have been disturbed by the alternative tailings impoundment.

Four acres of old growth could have been physically affected at the confluence mill site. However, about 14 acres would have been rendered ineffective habitat. Effects on old growth at McKay Creek are unknown as the land belongs to the state and private industry and was not surveyed.

Other impacts would be the same as Alternative IV with the following exceptions. Tailings impoundment location at McKay Creek would have impacted more riparian and riverine habitat than other alternatives. Local populations of riparian- and riverine-associated species, such as songbirds, amphibians, and small mammals likely would have been eliminated. Other species that use the riparian and riverine habitat, such as deer, moose, elk, and bear would have been displaced and possibly stressed.

A major elk wintering ground would have been destroyed and rendered ineffective due to noise/activity disturbance. Slightly less destruction of white-tailed winter range in the Rock Creek drainage would have occurred but would have been reduced because of the impoundment relocation. Noise and activity from trucks traveling to the rail load-out would still impact that winter range.

### Threatened and Endangered Species

The increase in road-killed deer and the associated risk of bald eagle mortality would have been the same as Alternative III. A small loss of potential peregrine falcon foraging habitat (37 acres of wetland) would have occurred within the McKay Creek tailings impoundment.

There would have been a direct, physical loss of 737 acres of grizzly bear habitat due to the mill site, tailings impoundment, and utility and access corridor locations compared to 573 for Alternative II. The increased level of human activity would have further displaced bears using Rock and McKay creeks' riparian areas. Habitat effectiveness would have been reduced on an estimated 2595 acres (3560 acres with Alternative II). The open road (ORD) and total road densities (TRD) would have increased in BAA 7-6-1 from 0.75 and 0.98 miles/square mile to 0.82 and 1.17 miles/square mile, respectively. (The KNF ORD standard is 0.75 miles/square mile; there is no standard for TRD.) Habitat effectiveness in the affected bear management units (BMU 5 and 6) would have decreased to 72.7 and 70.6 percent, respectively. This is just marginally over the standard of 70 percent.

The closure of additional roads by the KNF to meet ORD standards for grizzly bear would have benefitted gray wolves, but that amount of area closed would not compensate for the habitat effectiveness losses created by this alternative (increased road mileage = 7.4 miles). Additional road closures would have been needed to retain current habitat effectiveness for wolves.

### Socioeconomics

The impacts on employment, worker/family immigration, community services and government finances would have been similar to Alternative IV.

The impoundment, however, would have occupied a section of state land. Regulations require that the state manage school sections for maximum economic gain. The state would likely gain nothing from deposition of tailings on this land, and would likely regard the tailings impoundment as a potential liability. It is unlikely that the state would have approved a lease of this land to ASARCO. ASARCO would either have to have purchased the state-owned land or proposed a land exchange which could take several years to complete. ASARCO also would have to have obtained leases for, or purchase, the privately owned lands.

### Transportation

Soil disturbance necessary for roads associated with this alternative would have totaled about 47 acres; 35 acres for construction and 12 acres for reconstruction. Necessary clearing would have totaled about 60 acres; 45 acres for construction and 15 acres for reconstruction.

The tailings impoundment would have necessitated reconstruction of about 1 mile of FDR No. 1022. Construction of about 3.8 miles of new road would have been necessary to replace existing FDR nos. 1022 and 2210 and to install a non-numbered access road to south side of McKay Creek. The non-numbered road could have been within the dam impoundment area or connect to roads that the impoundment would isolate. It could have been located on either side of McKay Creek to connect to existing roads and/or to provide access to the creek diversion for maintenance and inspection. It also would have provided public access to an existing trailhead near the proposed diversion. Actual dam placement and height would be critical for determining access needs.

A second road would need to have been constructed to provide continued vehicle access to the south side of the creek. It would have required a bridge over McKay Creek somewhere downstream of the impoundment dam. A private, non-numbered road provides access for the landowner and to permittees for an electronic site located to the east of the dam site on NFS lands.

Up to 1 acre of additional clearing may have been needed to accommodate turnouts and sight distance. The 3.8 miles of new road would have disturbed about 12 acres of soil and require 16 acres of clearing. One bridge would have been needed to cross McKay Creek. While no actual site was reviewed on the ground, less than 1 acre of disturbance would have been anticipated. The impoundment eventually would have inundated a number of existing roads in the tailings impoundment area, reducing access to private timber and state lands in the area.

Traffic on these roads would have included ASARCO maintenance and administration traffic, Forest Service administration traffic, and recreation vehicles. Estimated traffic volumes (under 30 ADT) and traffic patterns would have justified a single-lane, gravel road with turnouts.

Access to the Miller Gulch load-out would have been via existing FDR No. 150 to its junction (at Engle Creek) with reconstructed FDR No. 150B, then to Government Mountain Road, and finally to the load-out. All existing roads would have needed minor reconstruction and gravel surfacing to a single-lane width with turnouts. Two-tenths acres of soil disturbance and vegetation clearing for turnouts and sight-distance would have been required on existing roads. An existing treated timber bridge over Rock Creek would have needed replacement. Soil disturbance for bridge abutments replacement would have amounted to about 0.02 acres immediately adjacent to Rock Creek. The bridge-replacement impacts could have been mitigated by required BMPs in the contract, and by timing construction during normal low water flows.

Roads associated with load-out access would have been open to the public except for the small segment (0.3 mile) off of Government Mountain Road. This segment would have been limited to ASARCO and Montana Rail Link vehicles and signed to discourage public use. About one-half of the load-out access route was under county jurisdiction. Estimated traffic on these roads is about 25 ADT.

Cumulative traffic impacts would be similar to alternatives III and IV except for the unrestricted public travel on FDR No. 150B. On this segment, potential conflicts between public and mine-related traffic would have been increased. During summer and fall, increased public recreation traffic would have mixed with the year-round facility maintenance traffic on the impoundment access road.

ORD potentially could have been affected by the addition or deletion of roads in the system. For instance, the impoundment could have inundated several existing roads that might not have been replaced. The actual road mileage decrease would need to be assessed in the field to determine the change in ORD in the context of overall changes in the drainage.

### Recreation

Public access would have been restricted on about 580 acres associated with the tailings impoundment in McKay Creek and the mill site at the junction of the East and West forks of Rock Creek. The majority of the acreage in the McKay Creek drainage is owned by Crown Pacific, or the state. Some fishing opportunities would have been lost in McKay Creek since approximately 2.5 miles of the creek would have been rerouted. Hunting opportunities in McKay Creek drainage would have been affected since the majority of the bottomlands would be covered with tailings.

Mine and recreational use would have been mixed along approximately 5 miles of FDR No. 150, and along about 4 miles of access road in McKay Creek drainage. Recreational access to Forest Service Trail 924 in the McKay Creek drainage would have been affected during road reconstruction around the proposed tailings impoundment.

### Wilderness

The McKay Creek tailings impoundment would have been visible from the Goat Ridge area within the wilderness. This tailings location in closer proximity to the CMW would have increased the opportunity for sounds from impoundment construction to reach the wilderness. Effects from the mill site are similar to those for Alternative IV.

### Cultural Resources

Construction of the confluence mill site would have had direct impacts only on the Heidelberg Mine Road (24SA328) as discussed for Alternative IV. This road has been determined ineligible for listing on the NRHP and no mitigation measures would have been required. No other known cultural resources would have been impacted. The McKay Creek tailings impoundment and discharge lines area was not surveyed for cultural resources. Direct impacts to cultural resources in that area are unknown.

The types of indirect and cumulative effects to recorded cultural resources would have been similar to those described in Alternative II, but impacts to recorded sites would be less severe because of the decreased level of development in the vicinity of Rock Creek proposed under this alternative. Indirect and cumulative impacts to cultural resources in the vicinity of the McKay Creek tailings and discharge lines are unknown.

### Native American Treaty Rights

Tribal members exercising their treaty fishing rights would have suffered some loss of fishing opportunity on Rock Creek, and a complete loss of fishing opportunity on 15,000 feet of McKay Creek. There also would have been a loss of berry picking and herb gathering sites buried under the impoundment as well as impacts to tribal hunting rights. The percentage of the original treaty lands that would have been impacted by the McKay Creek alternative would be minimal.

### Sound

Project impacts would have been mitigated as described by the Alternative III as well as by the location of the tailings impoundment on McKay Creek. Impoundment construction and operations noise impacts to the Clark Fork River Valley, particularly to those residents near Noxon Dam would have been reduced. Since the impoundment was closer to the CMW, the potential for construction-related sounds to carry into the wilderness was increased.

### Scenic Resources

This impoundment site would not have been visible from viewpoints in the Clark Fork Valley, including Montana Highway 200, but would in immediate foreground views from relocated FDR No. 1022 for a distance of 2.8 miles along the south side of the impoundment.

Under this alternative, slurry and reclaim pipelines -- two 10-inch steel above-ground pipelines -- would have extended an additional 2 miles along relocated FDR No. 150 from Engle Creek in the Rock Creek drainage to near Montana Highway 200 to avoid more visible cut-and-fill slopes before heading up the McKay Creek drainage. This additional paralleling of FDR No. 150 would have extended the developed character of this utility corridor and resulted in minor visual impacts as this portion of the corridor would already contain the 230-kV transmission line and buried 12-inch water discharge line to the Clark Fork.

Other elements of this alternative -- the construction of two short (0.3- and 0.5-mile) roads in the McKay Creek drainage to connect with existing roads and the upgrading of FDR No. 150 to access the Miller Gulch rail load-out -- would have created minor visual impacts. Visual impacts of the load-out would have been the same as Alternative III. Impacts of the upper utility corridor from Engle Creek to the confluence mill site would have been the same as Alternative IV.

The impoundment also would have been visible in middleground views (0.5 to 3 miles distant) from the trail systems in the McKay Creek drainage that access the CMW -- the Wanless Lake, Bear Paw, and Goat Ridge trails. Visibility of the impoundment would have been greater on higher reaches of these trails near the CMW where tree density was relatively low and views were more open. The impoundment also would have been visible in background views (3 miles or greater) from Goat and Engle peaks within the CMW. For all viewpoints, the grayish-white color and fine texture of the tailings covering the valley floor would have contrasted dramatically with adjacent tree-covered hillsides for the mine life. Visual impacts would have been adverse, long term, and significant to those recreationists and visitors who value the existing, natural-appearing landscape in this drainage.

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